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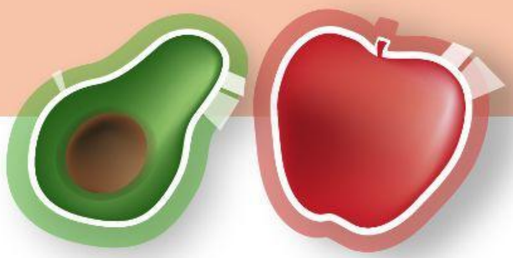
# GOODFOOD : Education to become responsible food consumers

Training Course (4th -8th September, IES Monte Miravete, Torreaguera – Murcia, Spain)

# WHY GOODFOOD?



## The landscape of the current food system (WHO, 2023)

World Health Organization

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31% EU GHG

11% EU GHG

Culture, social, economic and knowledge factors

| Farmers, producers | Distribution business, food industry, retailing | Consumers, decission makers |
|---|---|---|
| Food Production (agriculture, livestock) | Food Availability (processing, distribution) | Consumption |

Climate change

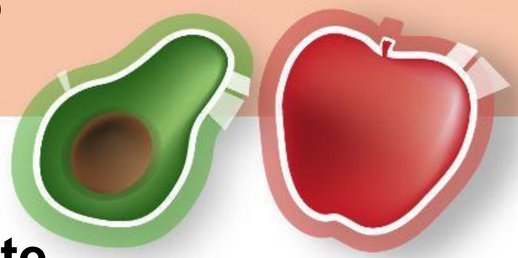
Natural resources (biodiversity, soil, water, energy )

WHO

Health problems

Suficient, Affordable, Nutritious, Healthy, Food for all Human Beings

# WHY GOODFOOD?



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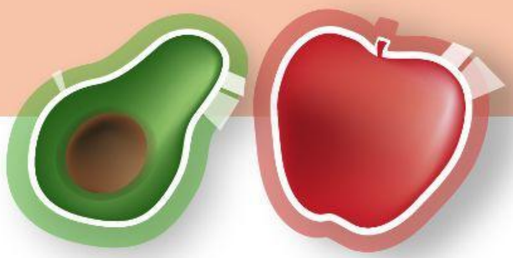
## Current position of the EU on sustainable food systems (2023)

**ENVIRONMENT Natural resources** ⟷ **Promote connection** ⟷ **AGRIFOOD CHAIN**

- REDUCE the **environmental impact of the agri-food chain:**
  - SUPPORTING **agriculture, rural and regional development**
  - PROMOTING **research and innovation in the food industry**
- PRESERVE the **future and social fairness of the food sector:**
  - IMPROVE the working conditions of **people working in food-related industries and producers**
  - REDUCE **food waste**
- IMPROVE the **well-being of European consumers**:
  - PROVIDE **healthier food** for wider sections of the population

# WHY GOODFOOD?



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## Food Education as a tool to:

- IMPROVE consumers **knowledge** about the role of our diet in our health and in the sustainability of the food production.
- PROVIDE consumers with the **capacity to make food choices** that rises the demand for more sustainable and healthy diets.
- MODIFY consumers **behaviour** regarding food acquisition, preparation, meal practices and storage.


GOODFOOD

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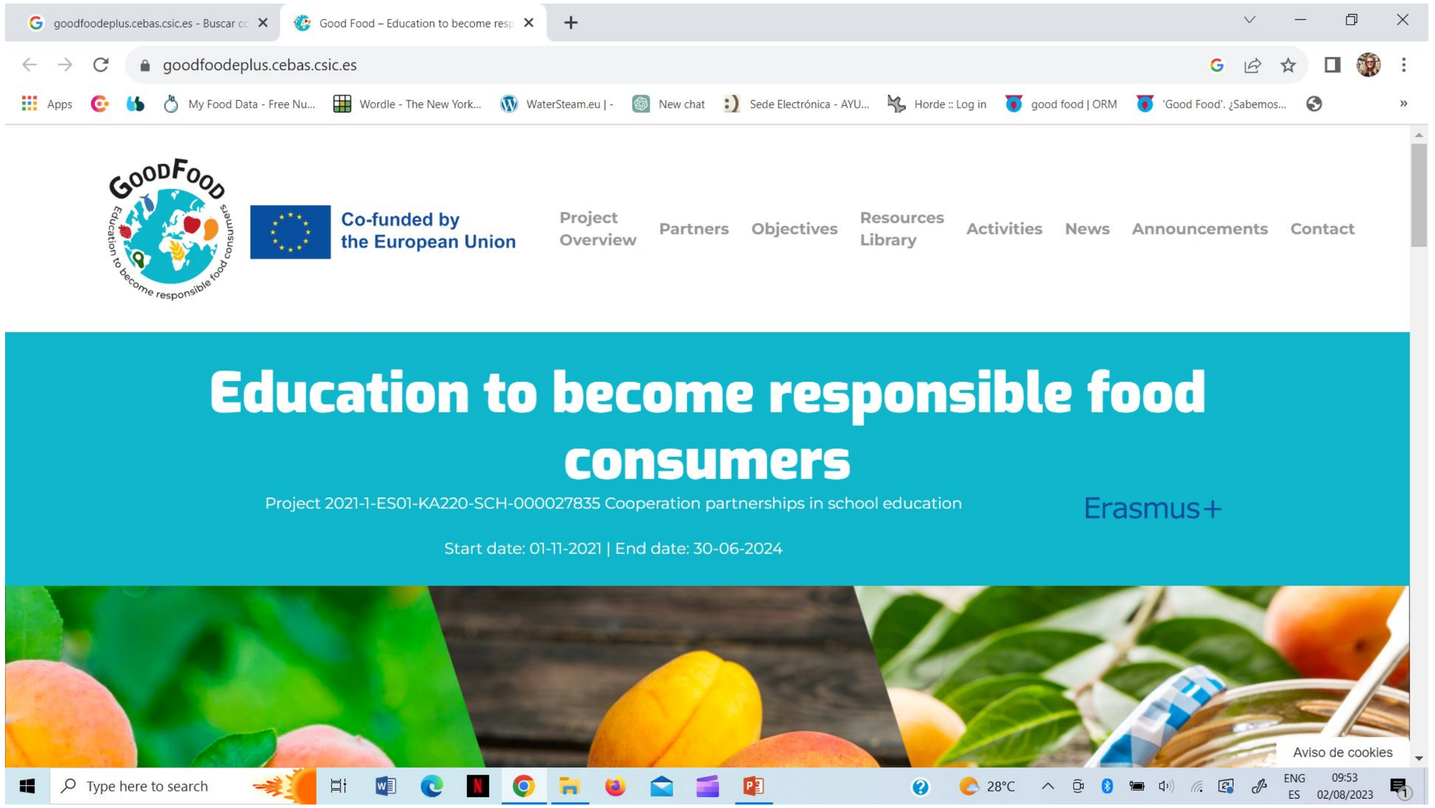
# GOODFOOD : Education to become responsible food consumers

## THE PROJECT

https://goodfoodeplus.cebas.csic.es/

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Associazione culturale Maieutike

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# GOODFOOD - Education to become responsible food consumers – Nutrition & Health

Training Course (4th -8th September, IES Monte Miravete, Torreaguera – Murcia, Spain)



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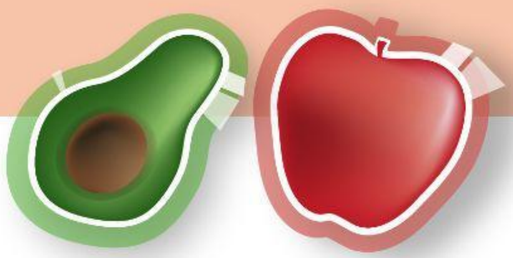
# OUR HEALTH

## Current scenario WHO

World Health Organization



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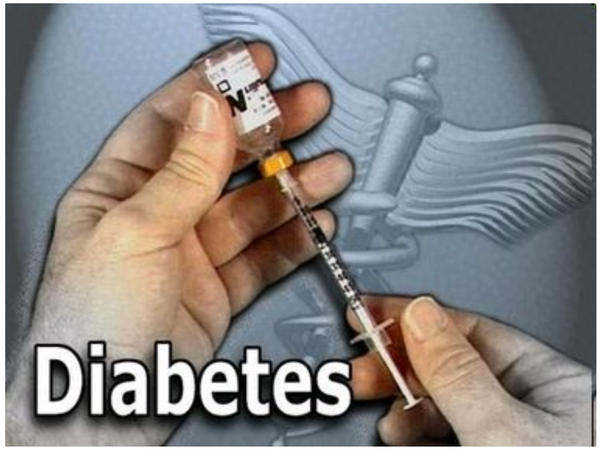
**Chronic diseases (NCD: non-communicable diseases)**

Main causes of worldwide death (28% increase from year 2000 to 2019)

**Cardiovascular disease (18 millions)**

**Cancer (9 millions)**

**Chronic respiratory disease (4 millions)**

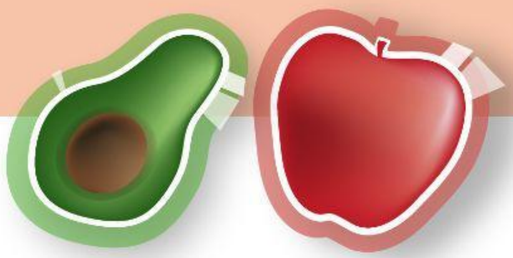



**Diabetes (2 millions)**

# OUR HEALTH

## Main risk factors

World Health Organization



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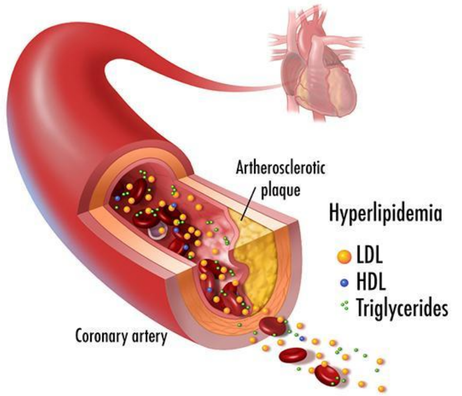
- Environmental factors
- Biological factors (genetic, physiological)
- Behavioural factors
  - Alcohol
  - Tobacco
  - Physical inactivity
  - Unhealthy diet !!!

Overweight/Obesity


High blood pressure




High blood lipids


High blood glucose

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# OUR HEALTH

## Some data in Europe, Spain and in the Region of Murcia: Overweight (OW) / Obesity (OB)

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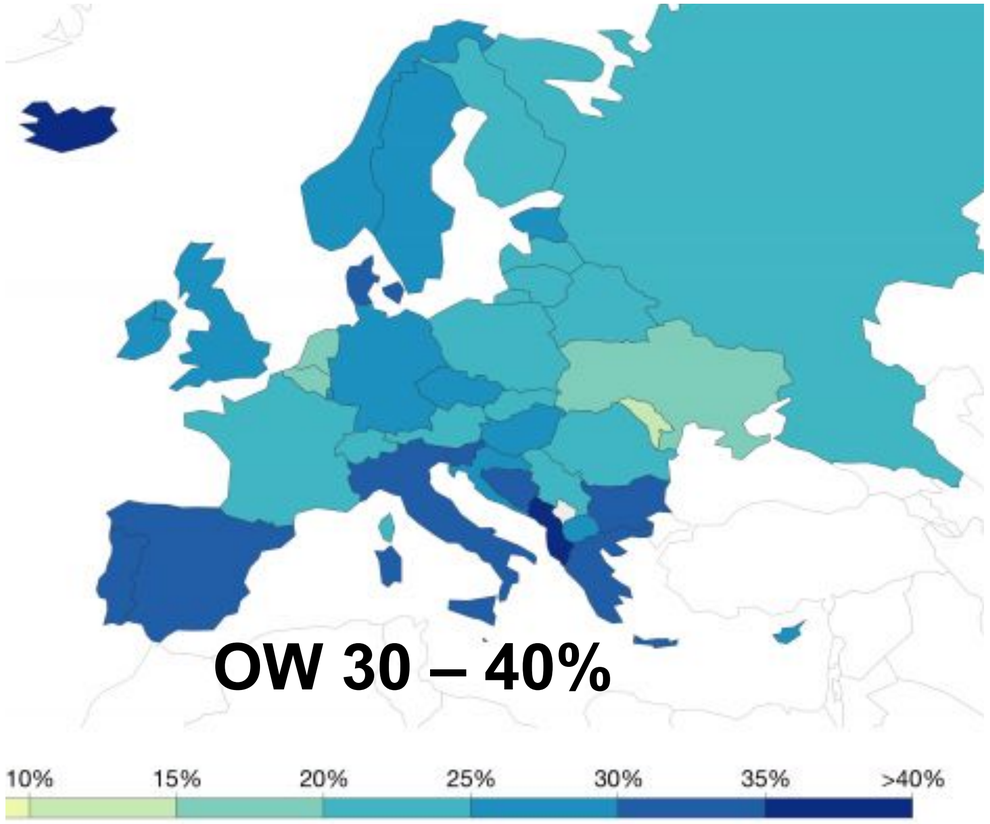
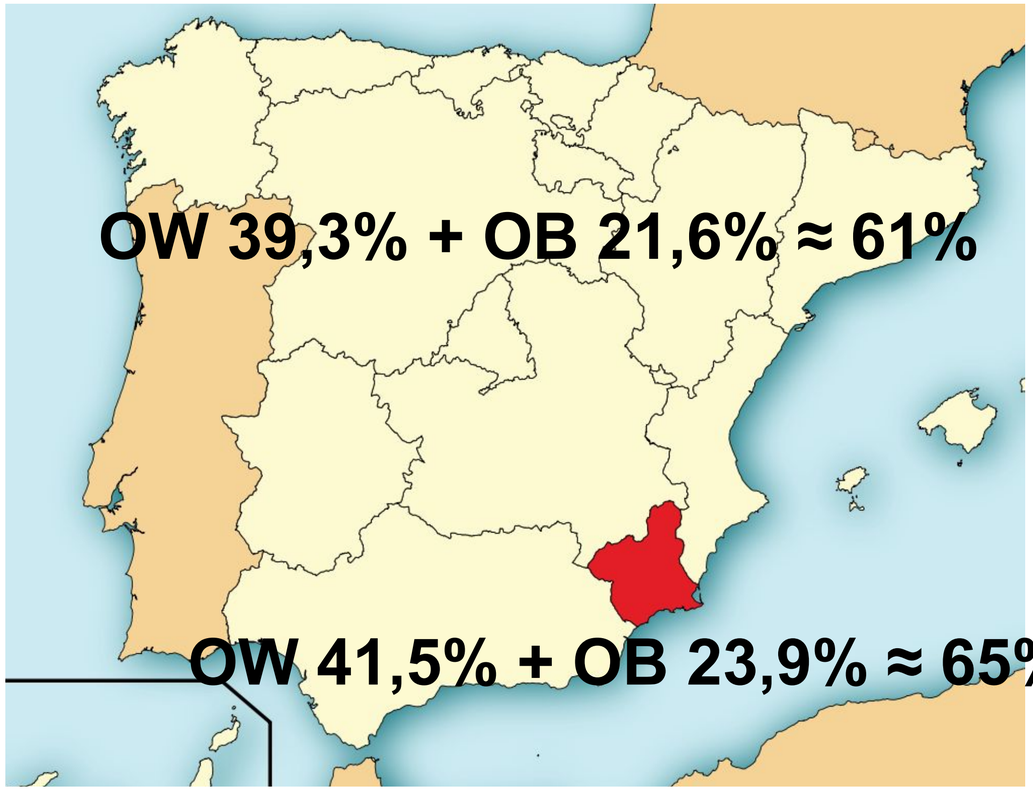



OW children in Europe (2016)




ENPE study (2016) Spanish population (25 to 64 y)

# SOME DATA

## Some data in the Region of Murcia: Chronic diseases

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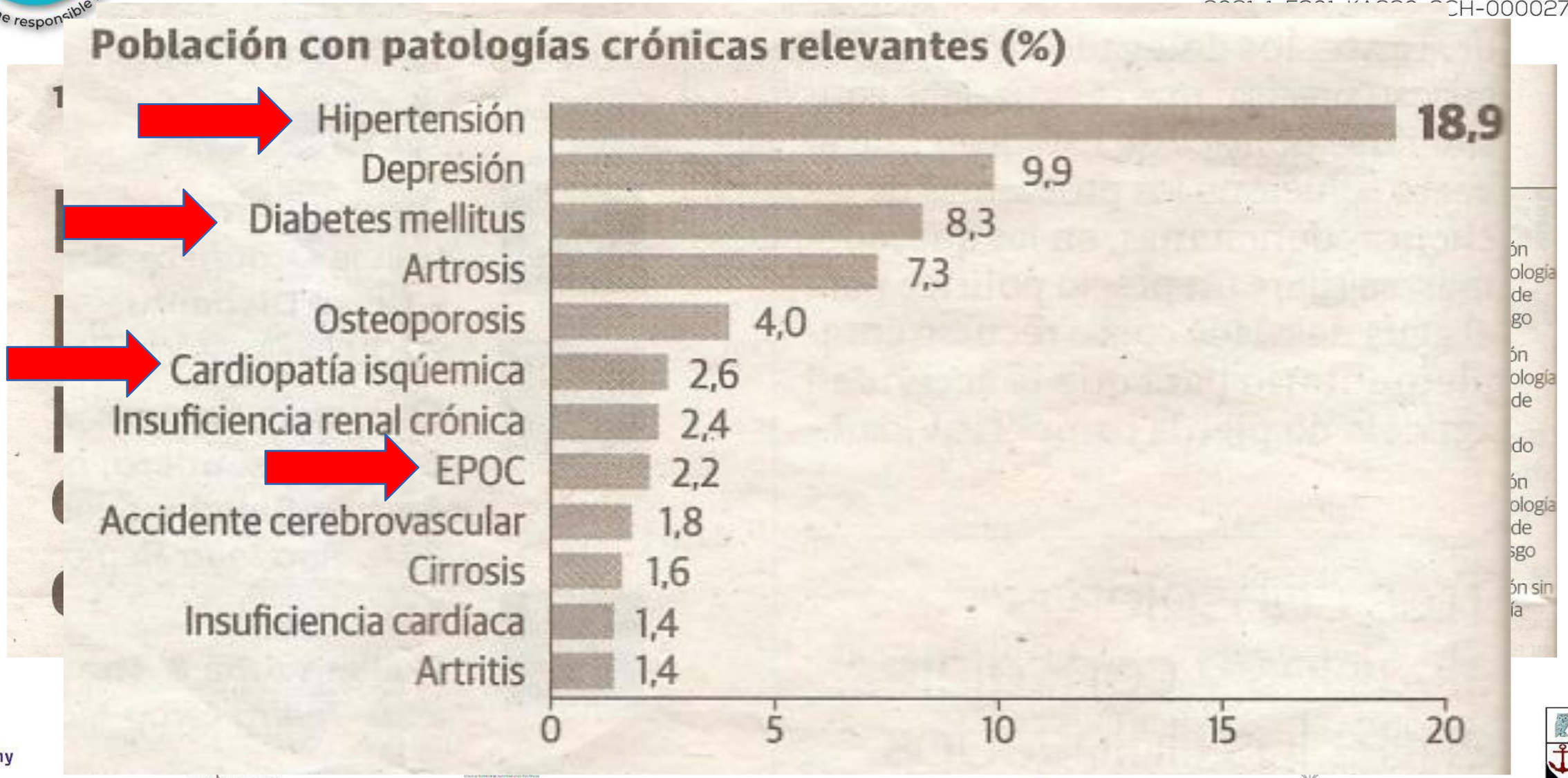

# OUR HEALTH

World Health Organization

## PREVENTION

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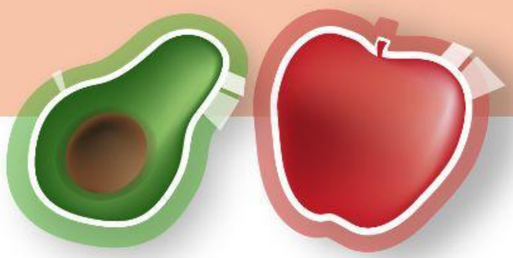
**40%-70%**


# DIET & HEALTH

# DIET & HEALTH



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## Main current issues related to our diet

## THE RIGHTS

https://www.who.int/news-room/fact-sheets/detail/healthy-diet

- Maintain energy intake (calories) = energy expenditure to avoid body weight/body fat increase. Moderate quantities and adapt portions (number/size) to your activity.

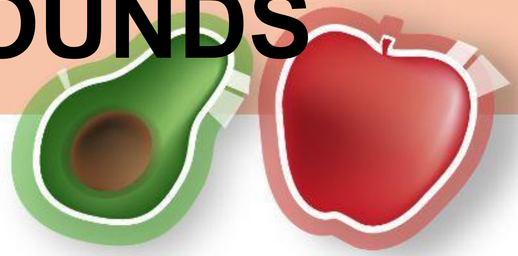
**LIMIT** saturated fats, trans (animal fat, processed foods), **INCREASE** (mono)unsaturated and (poly)unsaturated fats (olive oil, fish).


**REDUCE** salt and free added sugar. Limit sugary beverages.

**MODERATE** proteins, **OPT FOR** eggs, fish, white meat vs processed and red meat.
New sources (plant, insects, algi, etc)

**INCREASE** fibre, vitamins, minerals and **bioactive compounds** from Fruits + Vegetables, Legumes, Nuts, Whole grains

# BIOACTIVE COMPOUNDS



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## FOOD AND NUTRITION

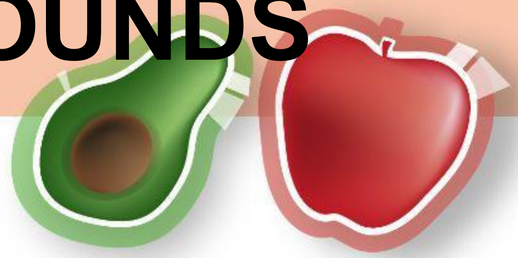

## FOOD AND HEALTH

- **Observational and intervention studies**

Healthy effects of certain diets and foods

## BIOACTIVE COMPOUNDS

# BIOACTIVE COMPOUNDS



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**Bioactive compounds** can be defined as any compound present in the food matrix that can produce physiological effects (healthy benefits) beyond their classical nutritional properties

## NUTRIENTS

*Macronutrients*

**Prebiotic carbohydrates**

Inulin, FOS

**Fatty acids**

Omega-6

(AL, AGL, ADGL, A

Omega-3

(ALA, EPA, DHA)

**Bioactive peptides**

*Micronutrients*

**Minerals**

**Vitamins**

**Fibers**

## PHYTOCHEMICALS

**Terpenoids**

Carotenoids

Phytoesterols

**Sulfur compounds**

Glucosinolates

**POLYPHENOLS**

Phenolic acids

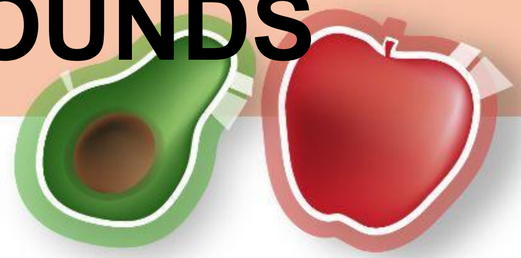
Flavonoids

Tannins

Anthocyanins

Lignans

# BIOACTIVE COMPOUNDS



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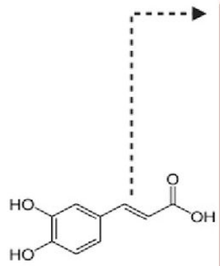
## POLYPHENOLS

>8000

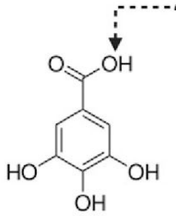
**Dietary polyphenols classes**

**Non-Flavonoids**

**Phenolic acids**



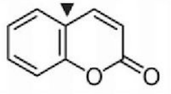
*Hydroxycinnamic acid*
Caffeic acid
Ferulic acid
p-coumaric acid
Sinapic acid
Quinic acid
Chlorogenic acid



*Hydroxybenzoic acid*
Gallic acid P-hydroxybenzoic acid
Protocatechuic acid
Syringic acid
Vanillic acid

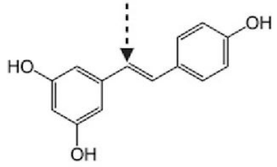
**Cumarins**

Coumarin
Esculetin
Coumermycin



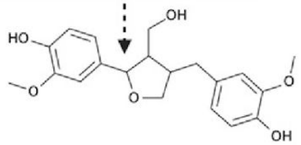
**Stilbenes**

Resveratrol
Pterostilbene



**Lignans**

Secoisolariciresinol
Pinoresino
Lariciresinol
Sesamin
Matairesinol
Hydroxymatairesinol



**Flavonoids**

*Flavanols*
Epicatechin
Catechin
Epigallocatechin
-gallate

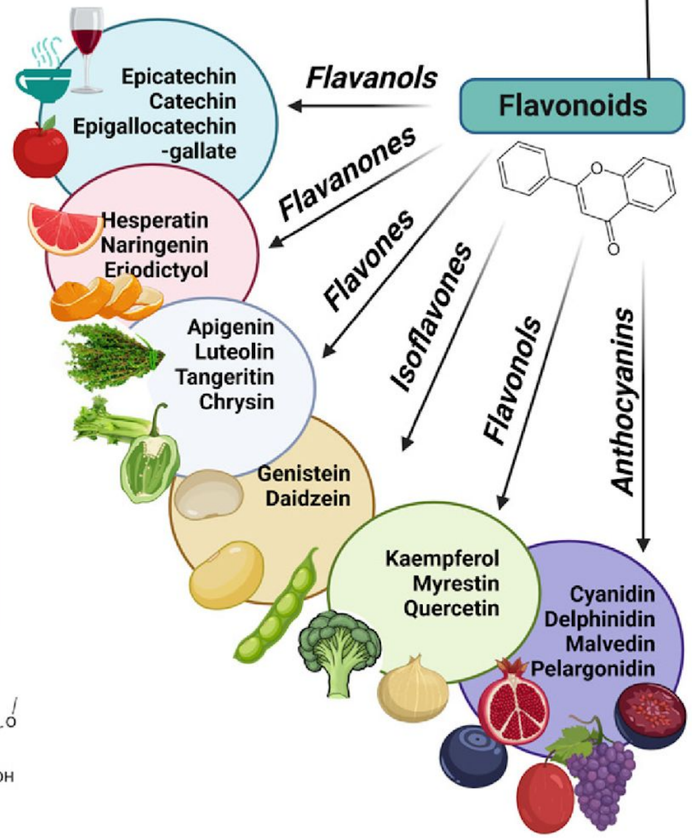
*Flavanones*
Hesperatin
Naringenin
Eriodictyol

*Flavones*
Apigenin
Luteolin
Tangeritin
Chrysin

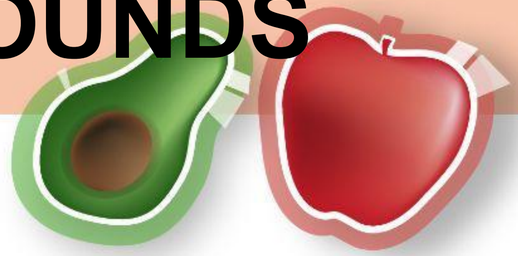
*Isoflavones*
Genistein
Daidzein

*Flavonols*
Kaempferol
Myrestin
Quercetin

*Anthocyanins*
Cyanidin
Delphinidin
Malvedin
Pelargonidin



# BIOACTIVE COMPOUNDS



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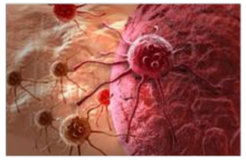
## Healthy effects

Cardiovascular diseases

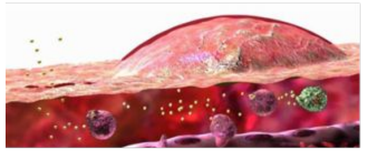
Diabetes

Cancer

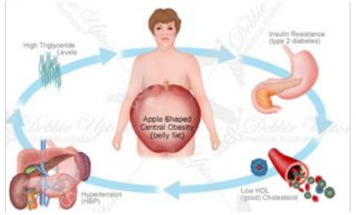


Bioactive compounds

Inflammation

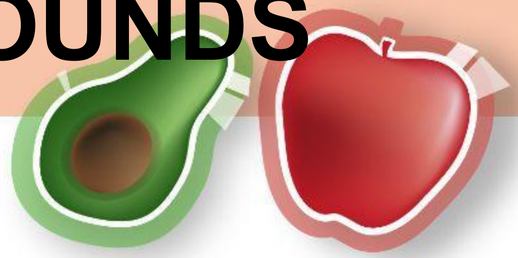


Metabolic syndrome




Neurodegenerative diseases

# BIOACTIVE COMPOUNDS



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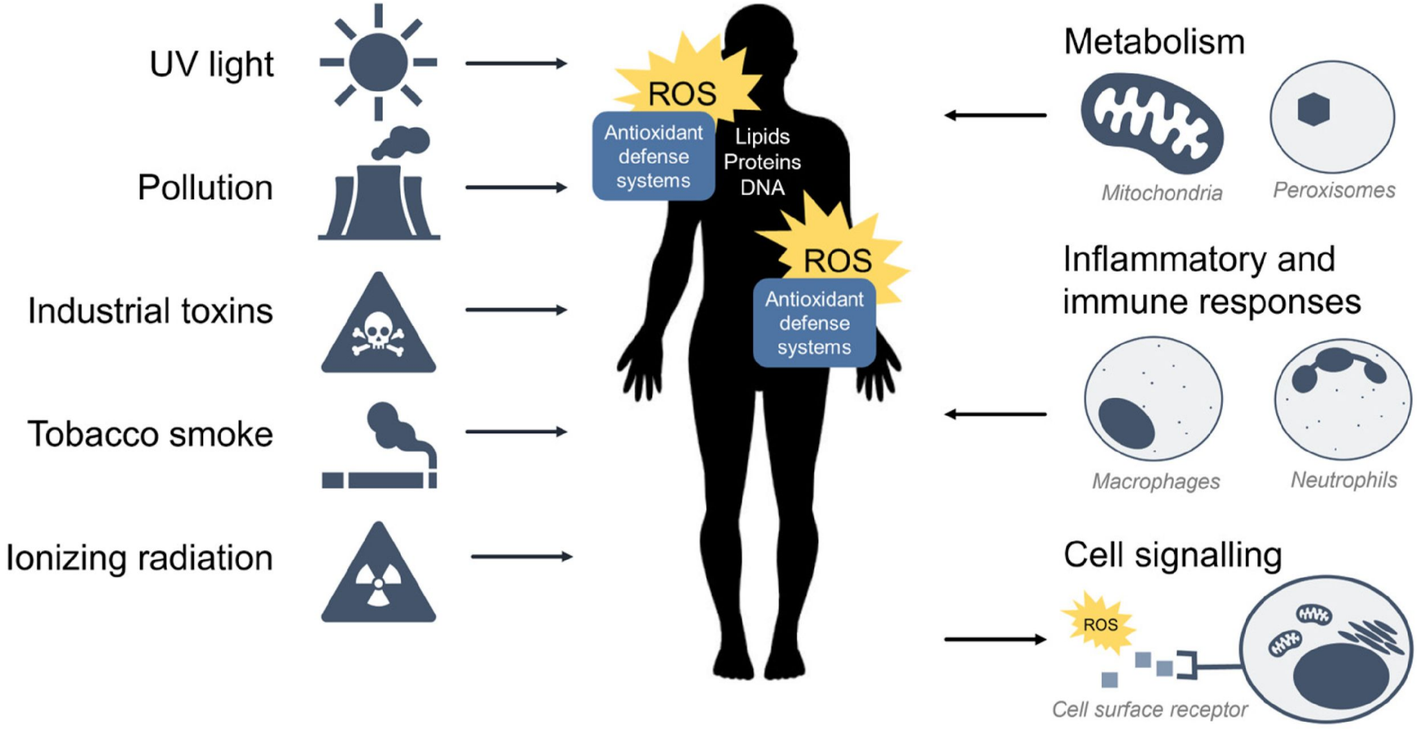
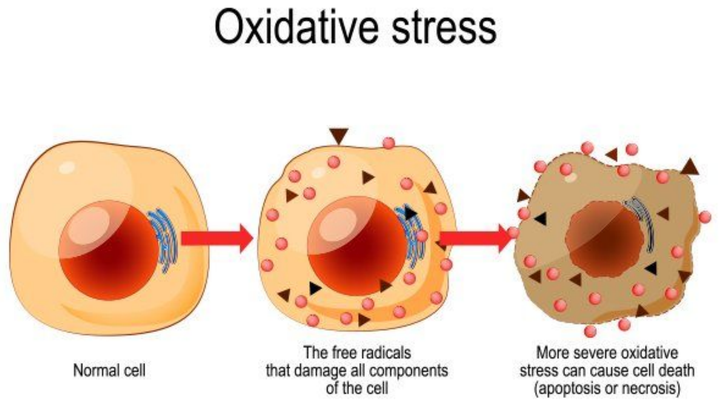
## Oxidative stress and antioxidants




# BIOACTIVE COMPOUNDS

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## FUNCTIONAL FOODS






## NUTRACEUTICALS


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# GOODFOOD : Education to become responsible food consumers

Learning Units on Nutrition and Health
CEBAS-CSIC


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# GOODFOOD: Learning Units at the website: Resources Libray – Educational Material

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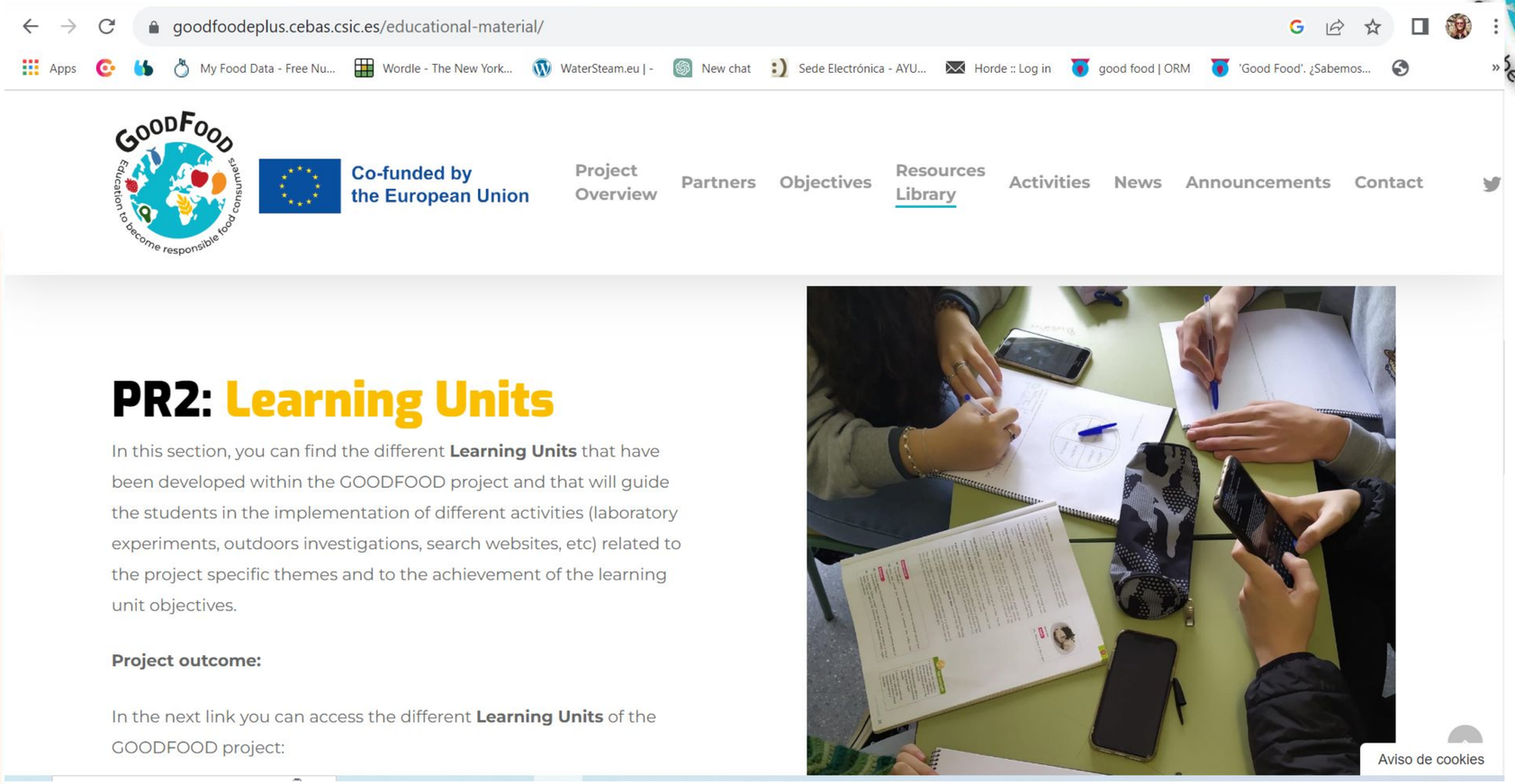


https://goodfoodeplus.cebas.csic.es/educational-material/

# Learning Units on Nutrition and Health

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- The fat component of the diet - the importance of the quality and quantity of fat in our food.

- How much salt do we eat? How does salt affect our health and how can we reduce its level in our daily diet ?

- Improving our knowledge about the concept of antioxidants.

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# OBJECTIVES

- **PLAN** and **DEVELOP** a **research project** following a scientific method.

- **LEARN THE RELEVANCE** of understanding and applying to their own dietary choices, the knowledge about the amount/quality of the **FAT/SALT/BIOACTIVES** present in foods and the relationship with disease prevention.

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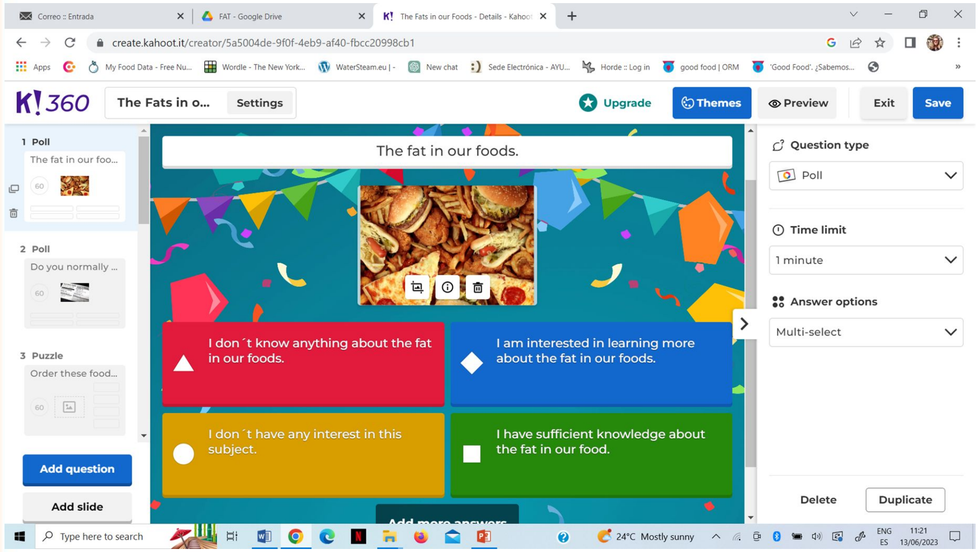
# 1. ORIENTATION

## Brainstorming exercises: How much do the students know?

- **Phase 1: Questions related to Fat/Salt: the students respond to Brainstorm questions (forum) o Kahoots.**




- **Phase 2: Games: card game, building up a map: The students rank foods in order from lowest to highest levels of Fat/Salt/Bioactives.**

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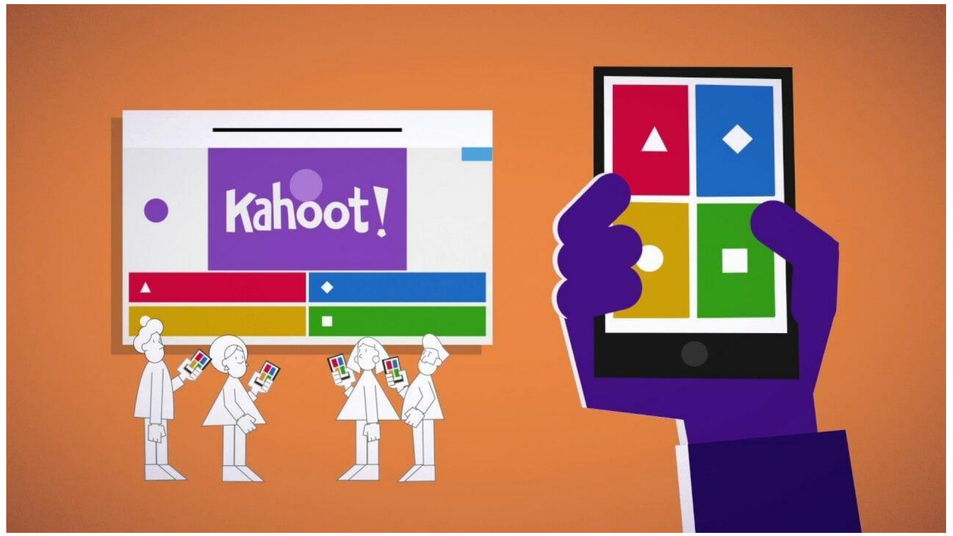
GoodFood
Education to become responsible food consumers

# Kahoots/Game/Map

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# 2. Conceptualization


- **What are the DIFFERENCES in the quantity/quality of fat/salt/bioactive compounds between the different foods/ingredients examined/selected, i.e. those that are part of the initial recipe?**

- **What CHANGES can I make to prepare a recipe/meal with a healthier level of fat/salt/bioactive compounds than the one in our initial recipe?**

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# 3. INVESTIGATION

## Proposed Project Activities: What can we INVESTIGATE about the Fat/Salt/Bioactive compounds we consume with our food?

1. We can ESTIMATE it:
Nutritional labels
Digital tools

2. We can QUANTIFY it and see it:
Laboratory analysis

3. We can FIND OUT how much we NEED/EAT:
Digital tools

4. We can FIND OUT about its relationship with DISEASE

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# Project Activities:
# Finding out more about the Fat/Salt in our foods

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# Activity 1

## ESTIMATE the Fat/Salt quantity in foods:
## Nutritional labels, Apps & Websites

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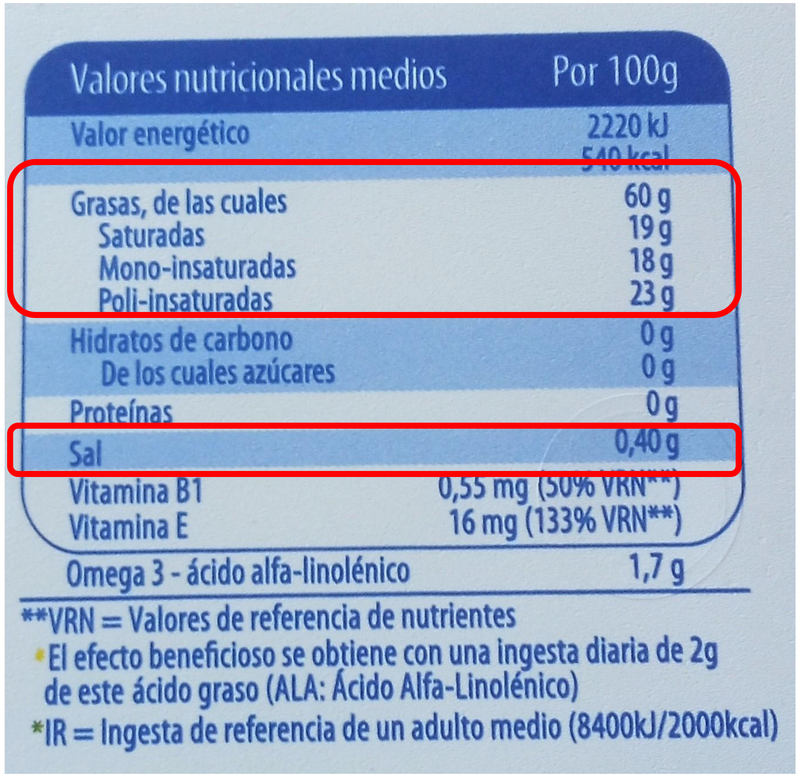
1. Go to the Supermarket


2. Check/Take note of the Nutritional label



| Valores nutricionales medios | Por 100g |
|---|---|
| Valor energético | 2220 kJ 540 kcal |
| Grasas, de las cuales | 60 g |
| Saturadas | 19 g |
| Mono-insaturadas | 18 g |
| Poli-insaturadas | 23 g |
| Hidratos de carbono | 0 g |
| De los cuales azúcares | 0 g |
| Proteínas | 0 g |
| Sal | 0,40 g |
| Vitamina B1 | 0,55 mg (50% VRN**) |
| Vitamina E | 16 mg (133% VRN**) |
| Omega 3 - ácido alfa-linolénico | 1,7 g |

**VRN = Valores de referencia de nutrientes
*El efecto beneficioso se obtiene con una ingesta diaria de 2g de este ácido graso (ALA: Ácido Alfa-Linolénico)
*IR = Ingesta de referencia de un adulto medio (8400kJ/2000kcal)

# Activity 1 (cont.)

## Estimate the Fat/Salt quantity in foods: Nutritional labels, Apps & Websites

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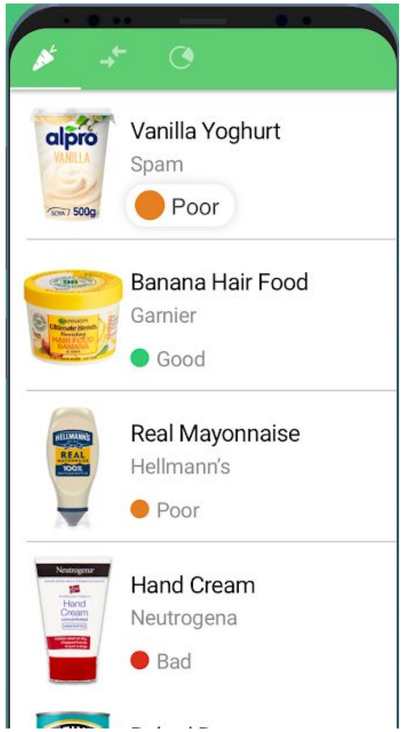
3. Use/Take note of the **YUKA** mobile App


**1. Download the App from your Play Store into your mobile**

**2. Scan the bar code of your selected product.**

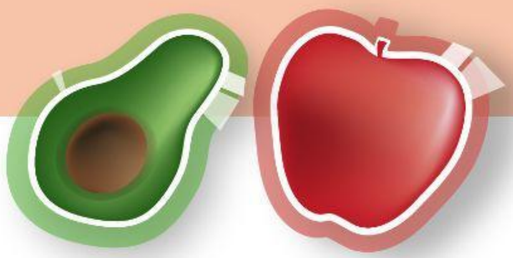

**3. Read the nutritional information/classification.**




**4. Store the nutritional information/classification of many foods.**

# Activity 1 (cont.)

## Estimate the Fat/Salt quantity in foods: Nutritional labels, Apps & Websites



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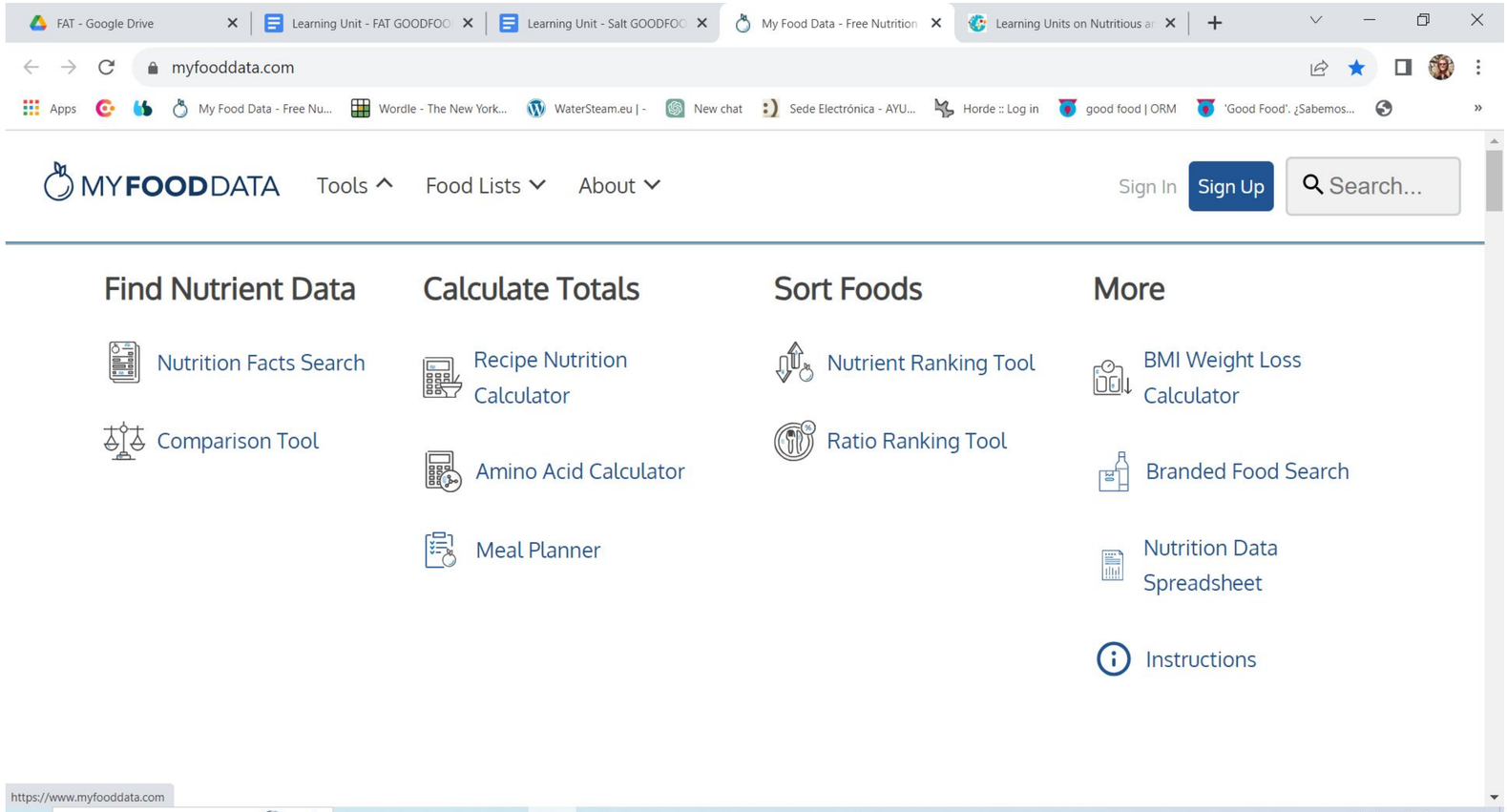
4. Use/Take note of the Nutritional Websites **MYFOODDATA**: https://www.myfooddata.com/ (USA)



# Activity 1 (cont.)

## Estimate the Fat/Salt quantity in foods: Nutritional labels, Apps & Websites

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BEDCA: https://www.bedca.net/bdpub/index.php (Spain)


Información de composición (por 100 g de porción comestible)

| Componente | Valor | Unidad | Fuente |
|---|---|---|---|
| Proximales | | | |
| alcohol (etanol) | 0 | g | 61 |
| energía, total | 2453 (589) | kJ (kcal) | 236 |
| grasa, total (lipidos totales) | 45.22 | g | 310 |
| proteina, total | 19.1333 | g | 179 |
| agua (humedad) | 5.8682 | g | 179 |
| Hidratos de Carbono | | | |
| fibra, dietetica total | 8.3475 | g | 179 |
| carbohidratos | 6.2038 | g | 61 |
| Grasas | | | |
| ácido graso 22:6 n-3 (ácido docosahexaenóico) | - | - | - |
| ácidos grasos, monoinsaturados totales | 27.98 | g | 310 |
| ácidos grasos, poliinsaturados totales | 11.14 | g | 310 |
| ácidos grasos saturados totales | 4.32 | g | 310 |
| ácido graso 12:0 (láurico) | - | - | - |
| ácido graso 14:0 (ácido mirístico) | 0.03 | g | 310 |
| ácido graso 16:0 (ácido palmítico) | 2.98 | g | 310 |
| ácido graso 18:0 (ácido esteárico) | 1.08 | g | 310 |
| ácido graso 18:1 n-9 cis (ácido oléico) | 27.3 | g | 310 |
| colesterol | 0 | mg | 61 |
| ácido graso 18:2 | 11.06 | g | 310 |
| ácido graso 18:3 | 0.05 | g | 310 |
| ácido graso 20:4 n-6 (ácido araquidónico) | - | - | - |

# Activity 1 (cont.)

## Estimate the Fat/Salt quantity in foods: Nutritional labels, Apps & Websites

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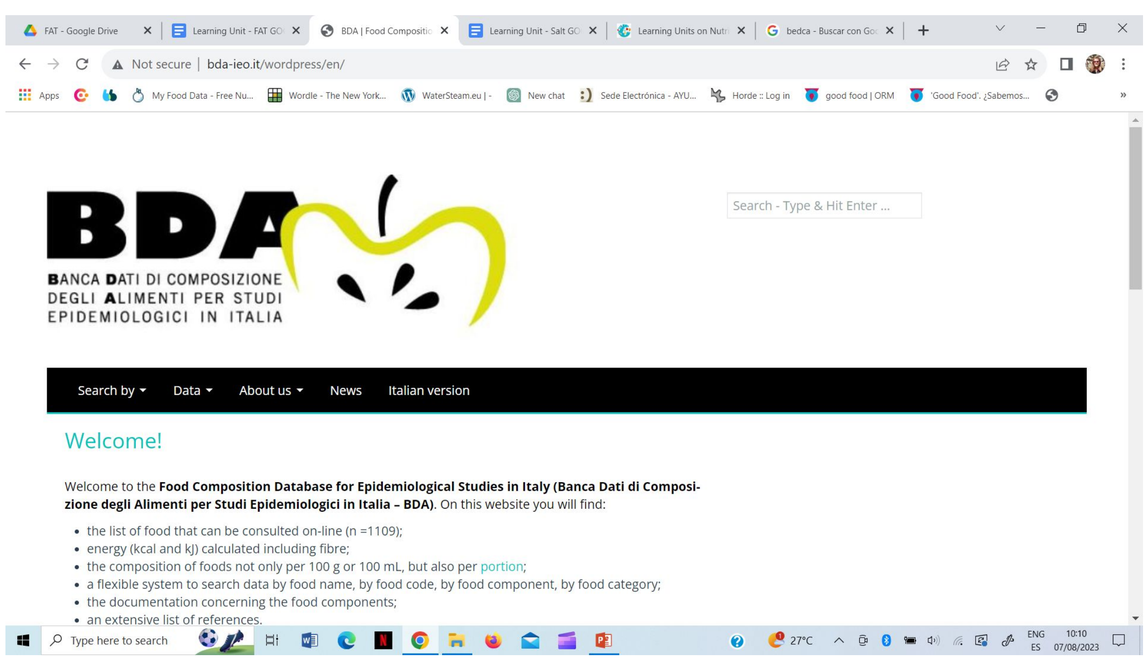
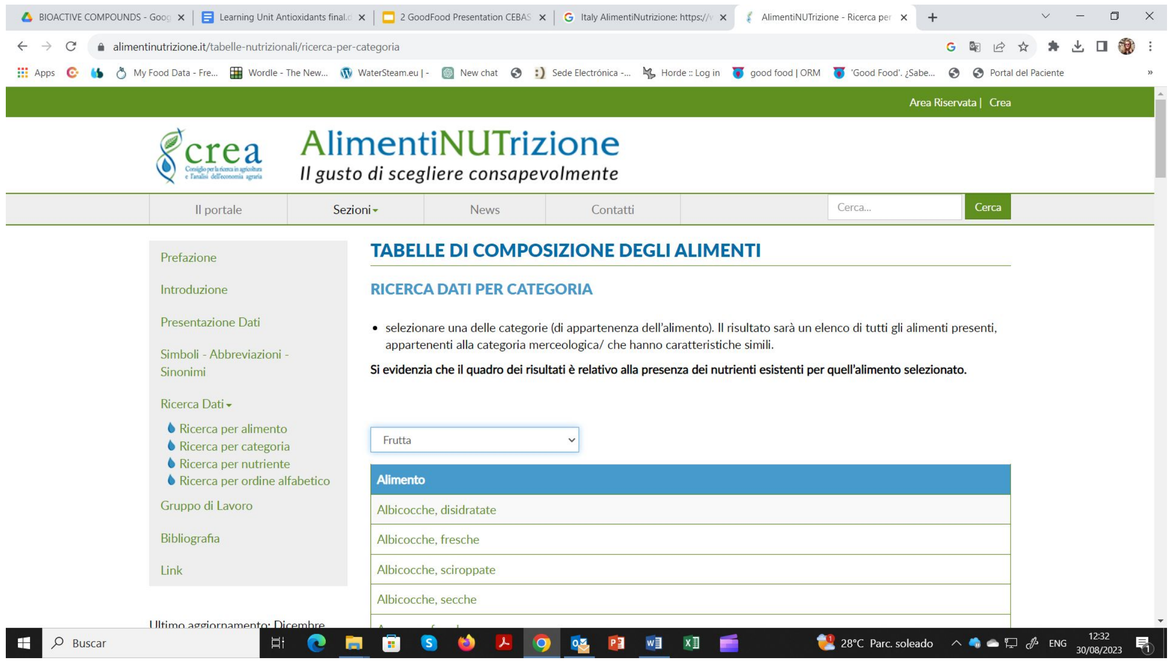
**BDA**: http://www.bda-ieo.it/ (Italy)




**CREA**: https://www.alimentinutrizione.it/il-portale (Italy)



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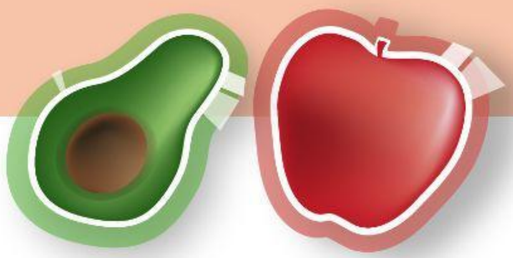
**QUANTITY and TYPE** of:
FAT (saturated, unsaturated, polyunsaturated, omegas)/SALT (Sodium)

https://docs.google.com/spreadsheets/d/1x4VmdsxsLM6IFkoAtBOKYi3A9ElvkOPr/edit#gid=535691890

https://docs.google.com/spreadsheets/d/1CxsYqPEolBhD9MQ4AXjZUk6k_00xVaYS/edit#gid=535691890

# Activity 3



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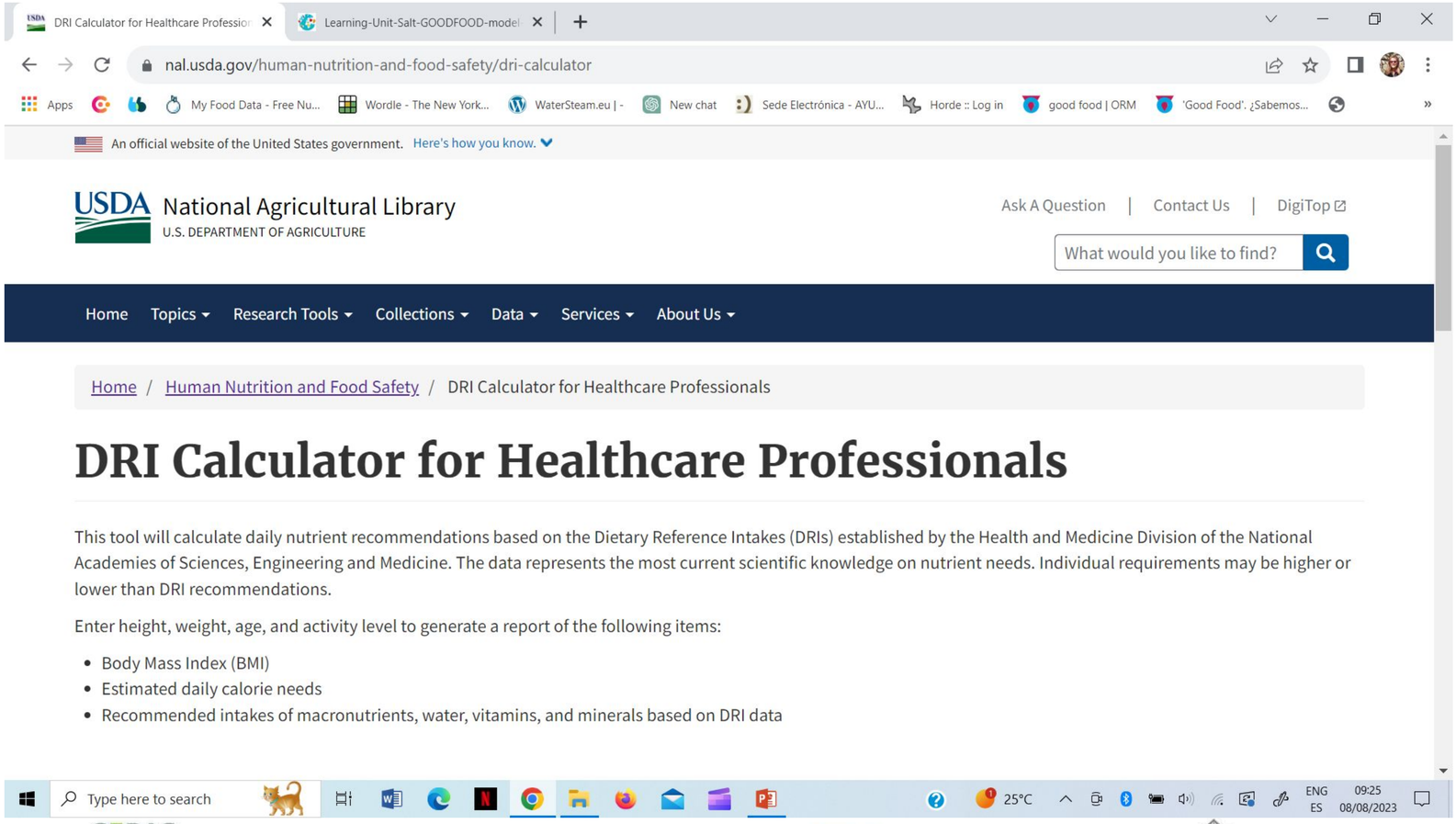
## ESTIMATE how much Fat/Salt we need/we eat: Digital tools

https://www.nal.usda.gov/human-nutrition-and-food-safety/dri-calculator

Daily quantity of FAT/SALT needed




Euracademy

Maieutiké Associazione culturale

CEBAS CSIC

Consiglio Nazionale delle Ricerche Istituto per la BioEconomia

PRISMA

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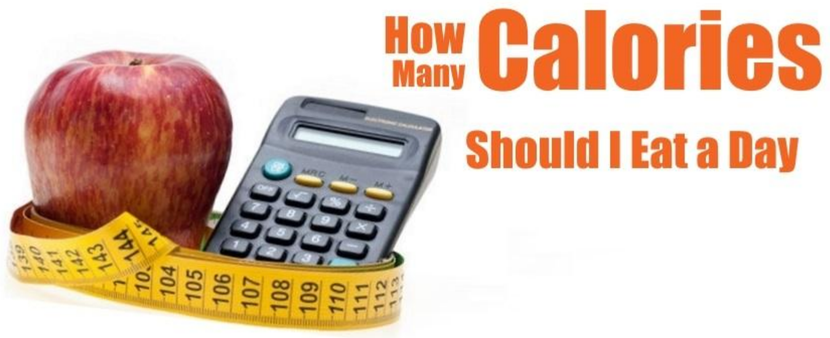
# Calculator activity

https://www.nal.usda.gov/human-nutrition-and-food-safety/dri-calculator



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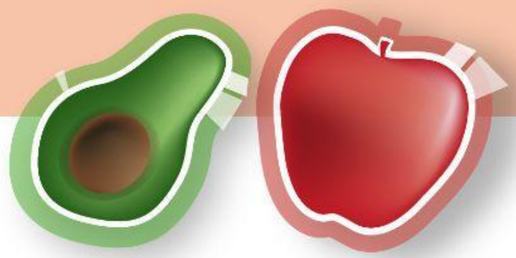
# DAILY RECOMMENDATIONS

https://docs.google.com/spreadsheets/d/1sdtRArgKEB44Pffp1p7ZiTxKnjxKW9DM/edit#gid=1158783858

https://docs.google.com/spreadsheets/d/1Tm0Xu4dDDIsW2xjSKp-wOKm3z5L_k6XS/edit#gid=115878385

# ESTIMATING SERVING SIZE



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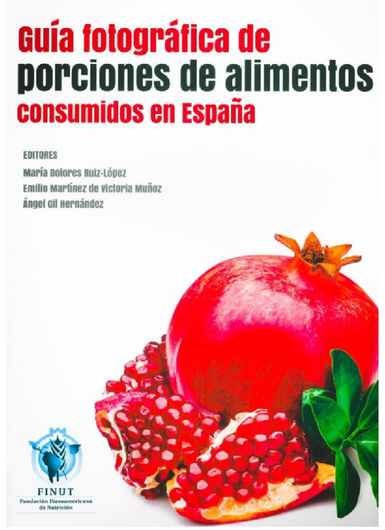
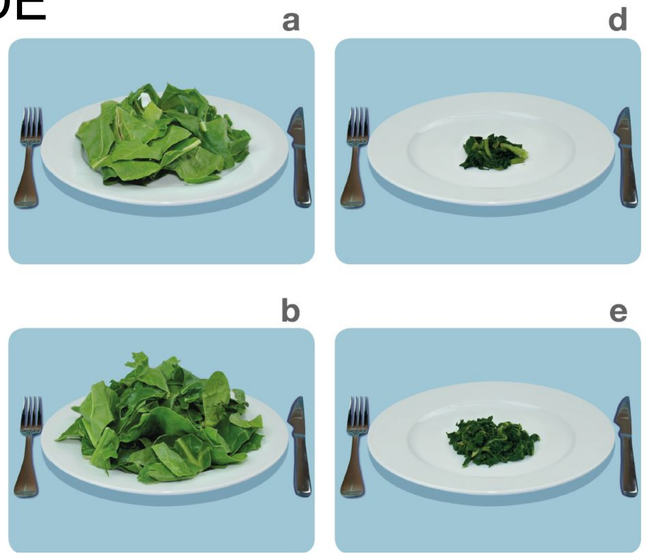
## 1. HOME SCALE


## 2. VISUAL GUIDE




| HORTALIZAS Y VERDURAS | | | | | | |
|---|---|---|---|---|---|---|
| ALIMENTO | Peso (g) | | | | | |
| | a | b | c | d | e | f |
| Acelga | 50 | 100 | 150 | - | - | - |
| Acelga cocida | - | - | - | 25 | 50 | 87 |
| Aguacate | 15 | 35 | 55 | 70 | 105 | 140 |
| Alcachofa | 30 | 60 | 120 | 245 | 372 | 490 |
| Alcachofa cocida | 40 | 60 | 77 | 93 | 110 | 130 |
| Berenjena | 25 | 50 | 75 | 100 | 150 | 332 |

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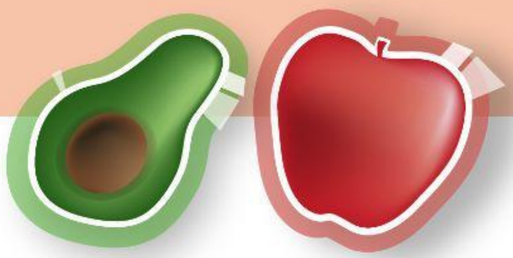
# DAILY RECOMMENDATIONS

https://docs.google.com/spreadsheets/d/1sdtRArgKEB44Pffp1p7ZiTxKnjxKW9DM/edit#gid=1158783858

https://docs.google.com/spreadsheets/d/1Tm0Xu4dDDIsW2xjSKp-wOKm3z5L_k6XS/edit#gid=1158783858

# Activity 4



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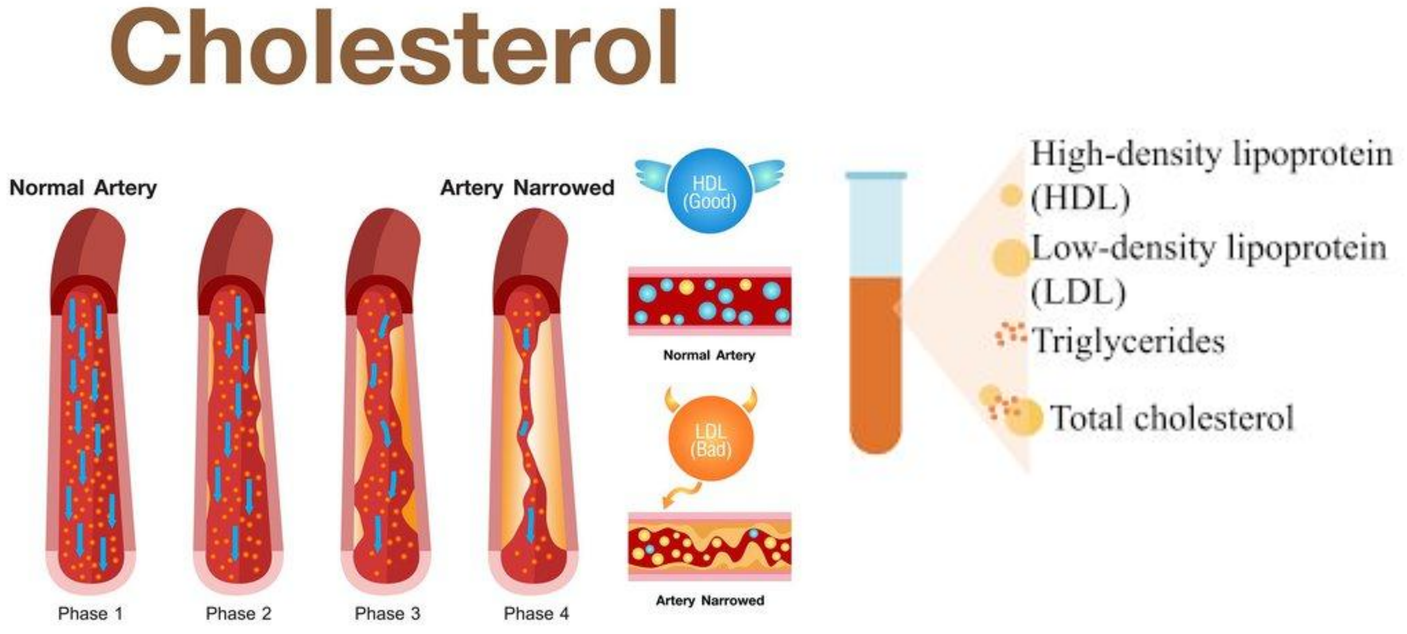
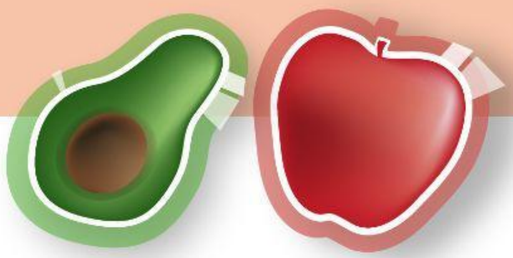
## RELATIONSHIP FAT/SALT – Risk factors (metabolic disorders)

**Information about the BMI and levels of lipids in blood and the meaning of these variables.**

# Activity 4



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## Information about the BMI/Blood lipids

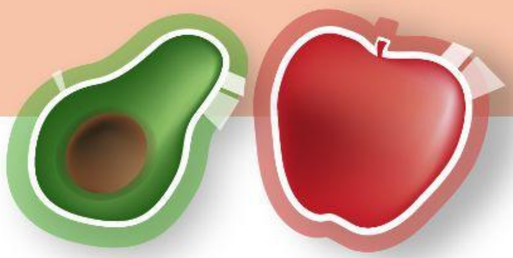
*Websites for checking the levels of blood lipids and BMI:*

**John Hopkins Institute (English):**
https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/lipid-panel#:~:text=Normal%3A%20Less%20than%20200%20mg,or%20above%20240%20mg%2FdL

**Medline (Spanish):** https://medlineplus.gov/spanish/cholesterollevelswhatyouneedtoknow.html

**BMI Tables and calculator:**
https://www.cdc.gov/obesity/basics/adult-defining.html#:~:text=If%20your%20BMI%20is%20less,falls%20within%20the%20obesity%20range

# Activity 4



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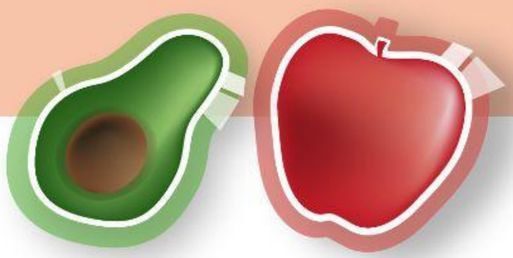
## RELATIONSHIP FAT/SALT – Risk factors (metabolic disorders)

https://paraspathology.com/blog-details.php?blog-id=cGFyYXNwYXRob2xvZ3k1MA

| LIPID PROFILE | | | |
|---|---|---|---|
| Triglycerides (Tg)<br>*(Sample: Serum; Method: Enzymatic, by GPO-TOPS)* | 84.43 | mg/dL | Normal: < 150<br>Borderline High: 150-199<br>High: 200-499<br>Very High: >= 500 |
| Total Cholesterol (TC)<br>*(Sample: Serum; Method: Enzymatic using CHOD-PAP)* | 125.07 | mg/dL | Desirable: <200<br>Borderline: 200 - 240<br>High: >240 |
| HDL Cholesterol<br>*(Sample: Serum; Method: Selective Inhibition)* | 49.6 | mg/dL | Major Risk Factor for Heart Disease: <40<br>Negative Risk Factor for Heart Disease: >=60 |
| Non HDL Cholesterol<br>*(Method: Calculated)* | 75.47 | mg/dl | optimal: < 130<br>desirable: 130-159<br>Borderline high:159-189<br>High: 189-220<br>very High :> =220 |
| LDL Cholesterol (Direct)<br>*(Sample: Serum; Method: Selective solubilisation)* | 52.95 | mg/dL | Optimal: < 100<br>Near Optimal: 100-129<br>Borderline high: 130-159<br>High: 160-189<br>Very High: >= 190 |

# Activity 4



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## Information about blood pressure

*Websites for checking information about the levels of blood pressure*

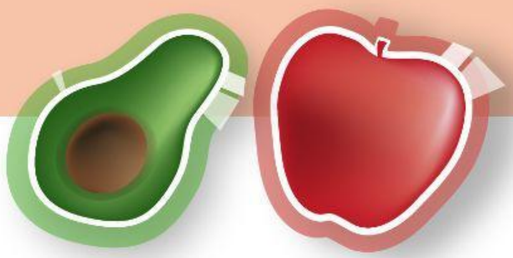
John Hopkins Institute (English):
https://www.hopkinsmedicine.org/health/conditions-and-diseases/high-blood-pressure-hypertension

MedlinePlus Health Information: https://medlineplus.gov/spanish/howtopreventhighbloodpressure.html

American Heart Association:
https://www.heart.org/en/health-topics/high-blood-pressure/understanding-blood-pressure-readings

| BLOOD PRESSURE CATEGORY | SYSTOLIC mm Hg (upper number) | | DIASTOLIC mm Hg (lower number) |
|---|---|---|---|
| NORMAL | LESS THAN 120 | and | LESS THAN 80 |
| ELEVATED | 120 – 129 | and | LESS THAN 80 |
| HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1 | 130 – 139 | or | 80 – 89 |
| HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2 | 140 OR HIGHER | or | 90 OR HIGHER |
| HYPERTENSIVE CRISIS (consult your doctor immediately) | HIGHER THAN 180 | and/or | HIGHER THAN 120 |

# Activity 4



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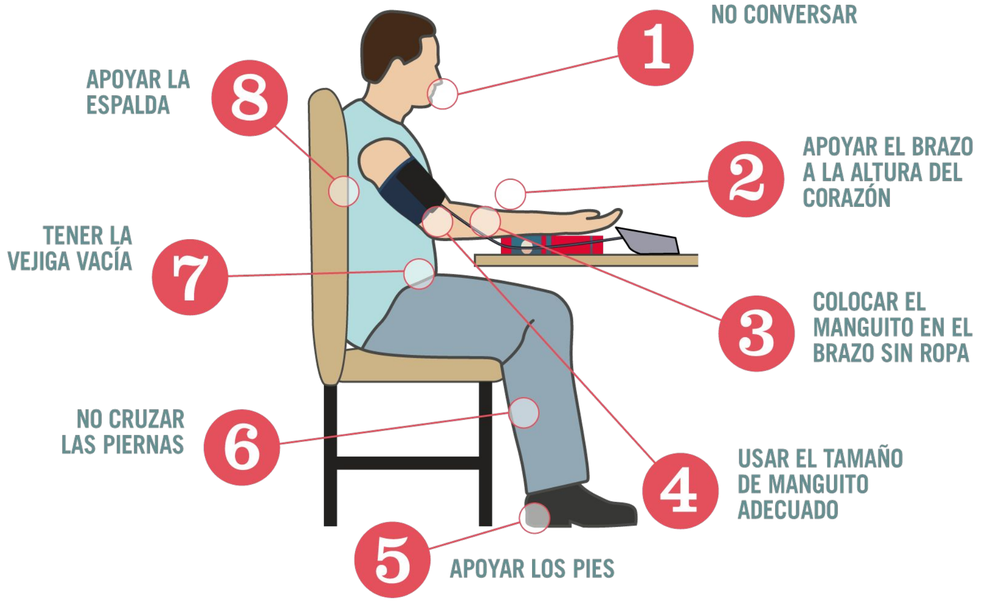
## RELATIONSHIP FAT/SALT – Risk factors (metabolic disorders)

- **Measure blood pressure (students, teachers):** current recommendations are to measure blood pressure at least once a year between the 14 and 45 y of age.

https://www.youtube.com/watch?v=PQTQyloINmA


https://www.paho.org/es/hearts-americas/hearts-americas-medicion-presion-arterial

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# LIPID LEVELS/BMI and BLOOD PRESSURE

https://docs.google.com/spreadsheets/d/1IhlvoSfUJ6CJjeddSiQsOPRVPFrt6cJu/edit#gid=871429897

https://docs.google.com/spreadsheets/d/1bHf_Hd5NX5Gpat15Gdx2x-JaRyQfrLPA/edit#gid=871429897

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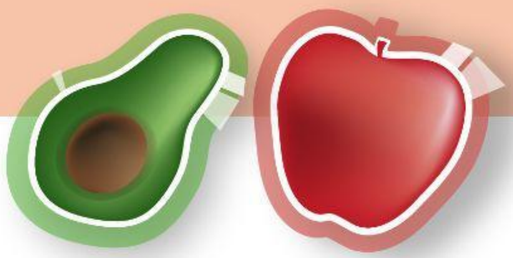
GoodFood
Education to become responsible food consumers

# Project Activities:
# Finding out more about the Bioactive compounds in our foods


Euracademy
Maieutike
Associazione culturale
CEBAS
CSIC
Consiglio Nazionale delle Ricerche
Istituto per la BioEconomia
M.M.
PRISMA

# Activity 1



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**Know the nature and amount of bioactive compounds present in the different ingredients : <u>Websites</u>**

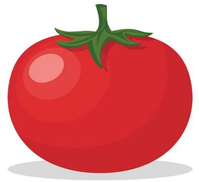
1. Use/Take note of the Nutritional Websites

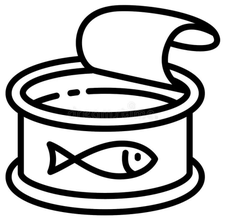
**PHENOLEXPLORER**: http://phenol-explorer.eu/

It is a database on polyphenol content in foods. The database contains more than 35000 content values for 500 different polyphenols in over 400 foods.

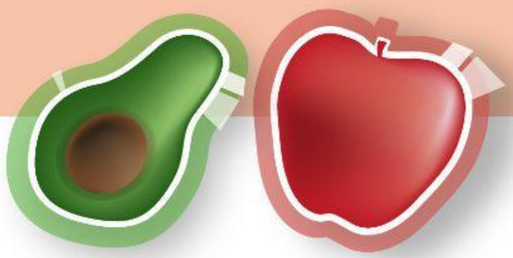
2. Calculate total antioxidant content

**ANTIOXIDANT FOOD TABLE**





# Activity 1



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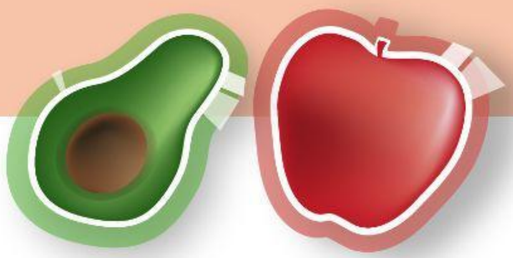
## Know the nature and amount of bioactive compounds present in the different ingredients : Websites

**TABLE RESULTS BIOACTIVE COMPOUNDS**

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | Food/Ingredient | Type of polyphenols | Total amount of polyphenols (mg/100g FW) | Total antioxidant content (nmol/100g) | grams in the recipe | Total polyphenols in the recipe (mg) | Total antioxidant content in the recipe /nmol) | |
| 4 | | | | | | | | |
| 5 | tomato | flavonoids, phenolic acids | 45,06 | 0,22 | 50 | 22,53 | 0,11 | |
| 6 | pasta | alkylphenols | 4,83 | 0,02 | 100 | 4,83 | 0,02 | |
| 7 | tuna | 0 | 0 | 0,21 | 20 | 0,00 | 0,04 | |
| 8 | olives | flavonoids, phenolic acids, c | 117,17 | 0,89 | 5 | 5,86 | 0,04 | |
| 9 | | | | | | 0,00 | 0,00 | |
| 10 | | | | | TOTAL | 33,22 | 0,22 | |
| 11 | | | | | | | | |

# Activity 3



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## ESTIMATE how much bioactive compounds (in particular polyphenols) we eat: Excel document

This tool to estimate the intake of dietary polyphenols was developed by a group of researchers under the framework of the European project Stance4Health

*Public Health Nutrition: 24(12), 3818–3824* doi:10.1017/S136898002100183X

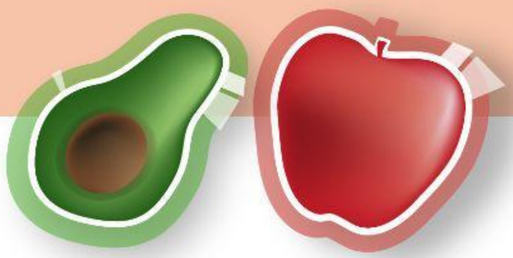
A useful and simple tool to evaluate and compare the intake of total dietary polyphenols in different populations

Daniel Hinojosa-Nogueira[1], Sergio Pérez-Burillo[1], Inés García-Rincón[1], José A Rufián-Henares[1,2,*] and Silvia Pastoriza[1]

[1]Departamento de Nutrición y Bromatología, Instituto de Nutrición y Tecnología de los Alimentos, Centro de Investigación Biomédica, Universidad de Granada, Granada, Spain: [2]Instituto de Investigación Biosanitaria IBS.Granada, Universidad de Granada, Granada, Spain

Submitted 16 October 2020: Final revision received 7 April 2021: Accepted 22 April 2021: First published online 27 April 2021

# Activity 3



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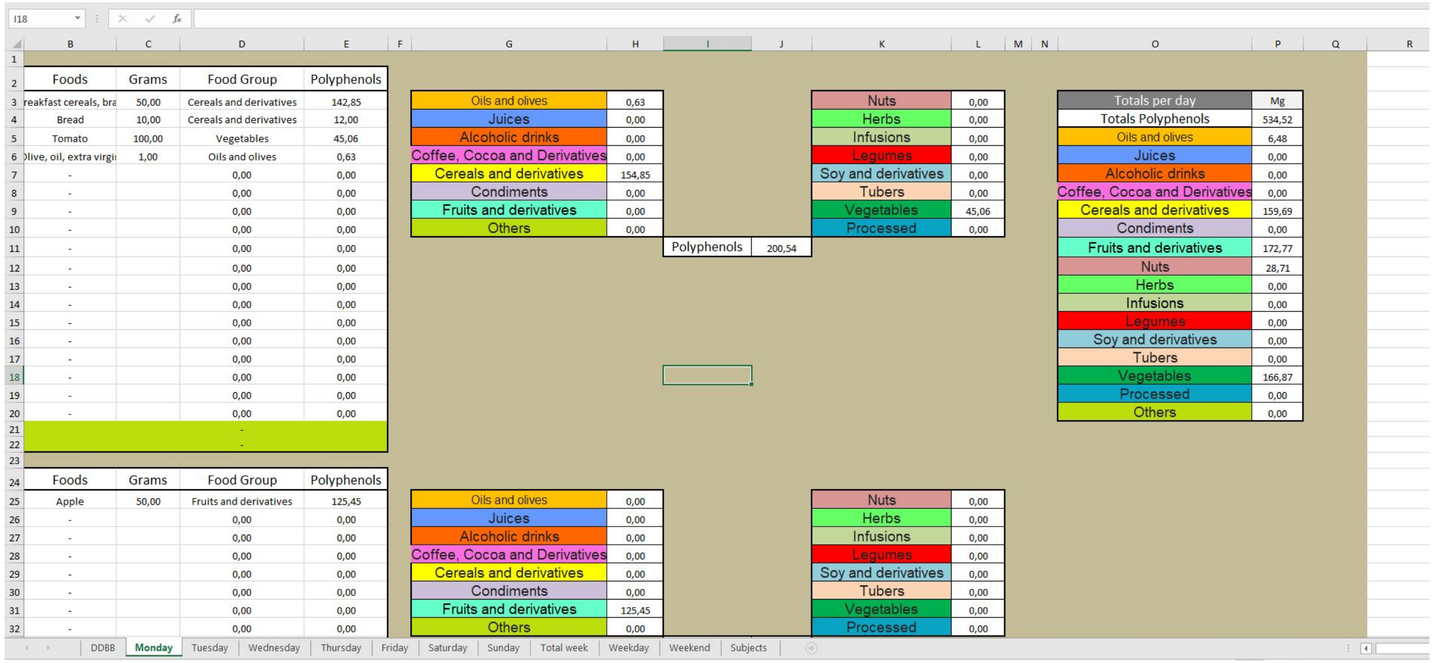
## ESTIMATE how much bioactive compounds (in particular polyphenols) we eat:

## Excel document



| Foods | Grams | Food Group | Polyphenols |
|---|---|---|---|
| reakfast cereals, bra | 50,00 | Cereals and derivatives | 142,85 |
| Bread | 10,00 | Cereals and derivatives | 12,00 |
| Tomato | 100,00 | Vegetables | 45,06 |
| live, oil, extra virgi | 1,00 | Oils and olives | 0,63 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | - | |
| - | | - | |

| Foods | Grams | Food Group | Polyphenols |
|---|---|---|---|
| Apple | 50,00 | Fruits and derivatives | 125,45 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |
| - | | 0,00 | 0,00 |

| | |
|---|---|
| Oils and olives | 0,63 |
| Juices | 0,00 |
| Alcoholic drinks | 0,00 |
| Coffee, Cocoa and Derivatives | 0,00 |
| Cereals and derivatives | 154,85 |
| Condiments | 0,00 |
| Fruits and derivatives | 0,00 |
| Others | 0,00 |

| | |
|---|---|
| Polyphenols | 200,54 |

| | |
|---|---|
| Nuts | 0,00 |
| Herbs | 0,00 |
| Infusions | 0,00 |
| Legumes | 0,00 |
| Soy and derivatives | 0,00 |
| Tubers | 0,00 |
| Vegetables | 45,06 |
| Processed | 0,00 |

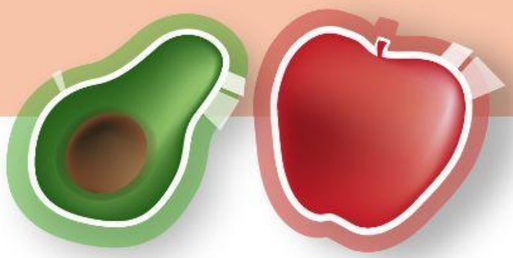
| Totals per day | Mg |
|---|---|
| Totals Polyphenols | 534,52 |
| Oils and olives | 6,48 |
| Juices | 0,00 |
| Alcoholic drinks | 0,00 |
| Coffee, Cocoa and Derivatives | 0,00 |
| Cereals and derivatives | 159,69 |
| Condiments | 0,00 |
| Fruits and derivatives | 172,77 |
| Nuts | 28,71 |
| Herbs | 0,00 |
| Infusions | 0,00 |
| Legumes | 0,00 |
| Soy and derivatives | 0,00 |
| Tubers | 0,00 |
| Vegetables | 166,87 |
| Processed | 0,00 |
| Others | 0,00 |

| | |
|---|---|
| Oils and olives | 0,00 |
| Juices | 0,00 |
| Alcoholic drinks | 0,00 |
| Coffee, Cocoa and Derivatives | 0,00 |
| Cereals and derivatives | 0,00 |
| Condiments | 0,00 |
| Fruits and derivatives | 125,45 |
| Others | 0,00 |

| | |
|---|---|
| Nuts | 0,00 |
| Herbs | 0,00 |
| Infusions | 0,00 |
| Legumes | 0,00 |
| Soy and derivatives | 0,00 |
| Tubers | 0,00 |
| Vegetables | 0,00 |
| Processed | 0,00 |

DD88 | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday | Total week | Weekday | Weekend | Subjects

# Activity 4



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## Understand the concept of “antioxidant activity” of different ingredients: Practical activity

### 1. Vitamin C content in different ingredients/ foods

Haced el experimento e introducir fotos


1. Mix  5 gr starch in 100 mL of water

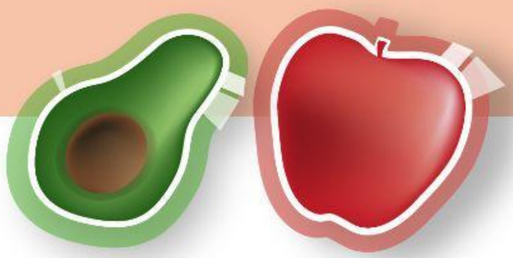
2. Add iodine solution (betadine) until a blue colour is achieved.

3. Extract the juice of the ingredient that you want to test

4. Add drops of this juice to the mixture until the blue color of the solution disappear. Count the amount of drops that you need.

The number of drops that you need indicate the vitamin C content of each ingredient that its related with its antioxidant capacity

# Activity 4



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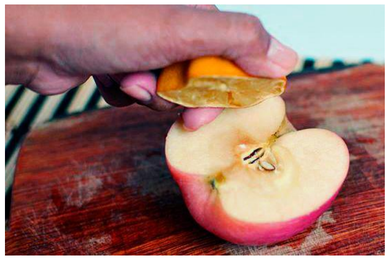
## Understand the concept of “antioxidant activity” of different ingredients: Practical activity

### 1. Antioxidant activity through browning rate of the apple slice.

1. Cut an apple in different slices



2. Spread the juice of the different ingredients you want to taste over the apple pieces

3. Monitor de apples during different hours to see how the oxidation process is progressing

Haced el experimento e introducir fotos

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GOODFOOD
Education to become responsible food consumers

# Laboratory activities

Euracademy
Maieutike Associazione culturale
CEBAS CSIC
Consiglio Nazionale delle Ricerche
Istituto per la BioEconomia
M.M.
PRISMA

# Activity 2

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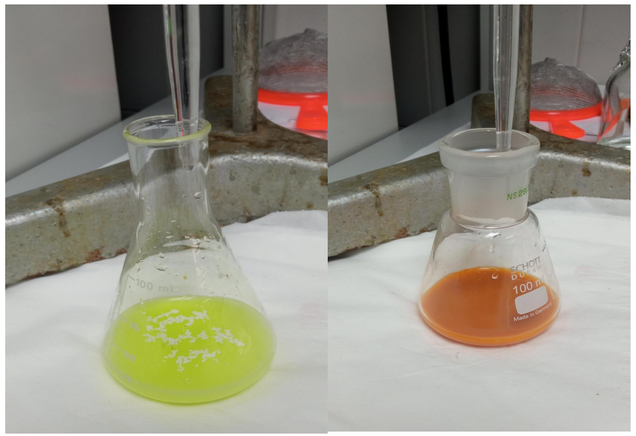
## MEASURE the Fat/Salt quantity in foods: Laboratory analyses

- **FAT content:** Gravimetric estimation after extraction with organic solvent.


- **SALT content:** Titration with chemical reaction.



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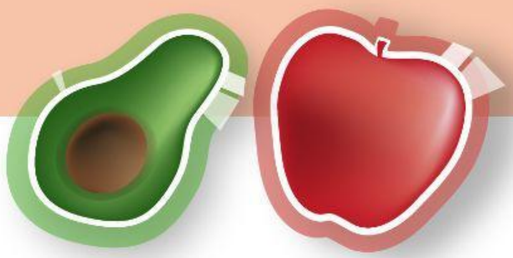
# QUANTITY of: FAT/SALT

https://docs.google.com/spreadsheets/d/1Cx78kB2zZZsBXwBjALc5eleSJdNx0zca/edit#gid=520788022

https://docs.google.com/spreadsheets/d/1Pq-a39ZsDGKSMGH89VwGgv07pgSvPYkj/edit#gid=520788022

# Activity 2



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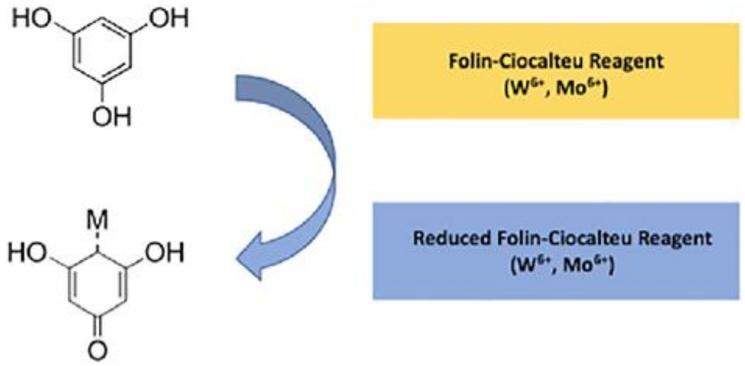
## MEASURE the total polyphenols: Laboratory analyses

### FOLIN CIOCALTEU METHOD

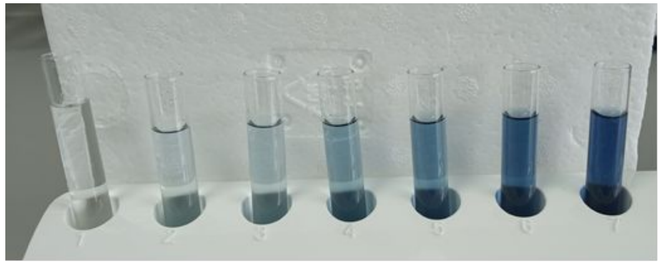



Gallic acid

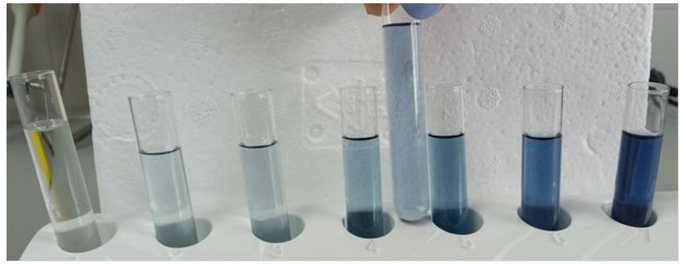
1. Prepare a calibration curve in water with gallic acid. Concentrations: 0, 50, 100, 250, 500, 750, 1000 mg/L

2. Prepare the polyphenol extract from the selected ingredients.

3. Mix each standard solution or polyphenol extract with water, Folin-Ciocalteau reagent, 10% solidum carbonate solution. Homogenize the flasks and keep in the dark at room temperature for 2 hours,.



Calibration curve



Sample compared with the calibration curve.

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# 3. CONCLUSIONS

- **REPORTING**: the different groups of students will present their findings to their colleagues (poster, oral presentation, videos, etc).


- **BRAINSTORM**: the different groups of students will try to come up with some general common ideas with regards to:

  ✔ How to read and understand the nutritional labels.
  ✔ Which/How digital tools to use to investigate the fat composition of foods.
  ✔ What general recommendations should be followed in our daily food choices regarding fat/salt.
  ✔ Which methods can be easily used to estimate the fat/salt composition of different foods and choose the right foods for your recipe.
  ✔ What the healthier levels of body weight/blood lipids/blood pressure are.
  ✔ ...

# 4. DISCUSSION


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- **Propose** alternative foods/ingredients that may be used to prepare a "**healthier recipe**". How much has this second recipe been improved?

- **Propose** a simple **label/advertisement/video** (?) with the information <u>about fat/salt</u> that they would consider important to help the consumers make a healthier choice.

- Ask and **discuss** in a **<u>forum</u>** questions like:

- **Has the whole experience changed their thoughts about eating certain fatty foods?**
- **Do they think they will change some of their habits?**
- **Have they eliminated some of the 'bad' foods they normally ate?**
- **Do they think they will enjoy going to the supermarket and check/learn more about the food they buy?**
- **Have they noticed any modification of their shopping/eating habits?**
- **Have they shared this knowledge/experience with their parents or other relatives?**
- **Did they understand the experience and were motivated to make some changes?**

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Thanks a lot for your attention

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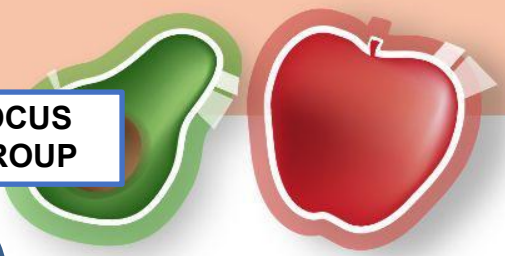
PRISMA

# GOOD FOOD - Education to become responsible food consumers

Flow diagram of the project



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PRISMA/ IBE-CNR

Partners

Teachers

Brainstorm

Students

Family

FOCUS GROUP

Preliminary Surveys

**PR1: Learning Methodology**

IBE-CNR/ PRISMA

**Learning needs**

**Form**

**Content**

- STEAM methodology
- Type of activities
- ITCs applications

- FOOD Sustainable production
- FOOD Healthy consumption
- FOOD Social context: Waste

**PR2: Learning Modules/Resources Library**

MAIEUTIKE/ IBE-CNR

**Develop school projects and activities**

- Implement learning activities
- Hands-on experiences
- Investigate, use and apply available ITCs

Spain, Greece, Italian schools

**Elaborate reports, ART (drawing, performing, writing, ect) and library of recipes**

CSIC/ MAIEUTIKÉ

**Efficacy Surveys**

**Select best examples and prepare Handbook**

**PR3: Handbook/Recipes Library /European Video-Slogan Competition**

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# GOODFOOD LEARNING METHODOLOGY

Francesca Ugolini - IBE-CNR

Training event (C1) of the
GOODFOOD project
04/09/2023 12:00-13:00

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# Objective

GOODFOOD aims to provide secondary schools with innovative methods and resources to promote sustainability and heathy food choices, raising awareness on

- sustainable and responsible food consumption
- need for a balanced and healthy diet

But also, increasing

- students' interest and competences in STEM with the inclusion of Art
- teachers' teaching efficacy

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# Project outputs

- **Video slogans** representing the creative digital task will aim at conveying a key message to peers and to the general public;

- Recipes' book with healthy/sustainable recipe made at home, replacing more traditional or junk food.


The final products will be presented in the final events of the project and promoted widely.

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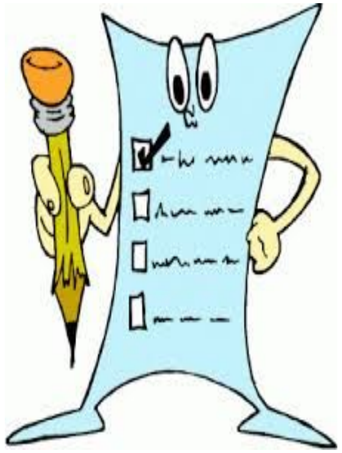
# Propaedeutic study



An initial survey on needs resulted that **students**

- are aware of the importance of environmental problems and have a positive attitude towards the protection of the environment.

- are interested in knowing more about the environmental impact of own diet/food habits, nutritional value of food.

- are interested in alternative ways of learning (e.g., hands-on activities, select what topics to focus on, explore within a wider context, and go out of the classroom to do fieldwork)

- are not familiar with using Art to communicate ideas and partially interested in Apps.

**Access to the results in your language:**

https://goodfoodeplus.cebas.csic.es/results/

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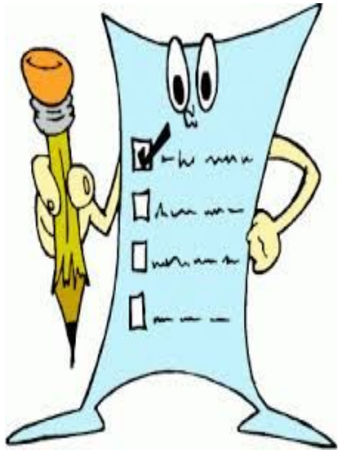
# Propaedeutic study



An initial survey on needs resulted that **teachers**

- are interested in learning about the environmental impact of own diet/food habits on the nutritional value of food.

- especially Italian and Greek teachers are similarly interested in being sustainable consumers.

- are not familiar (especially Greeks and Spaniards) with the use of Apps to check for the nutritional value of foods or to estimate the impact of food production on the environment.

- are interested in new teaching methodologies but they are not familiar with STEAM, IBL

**Access to the results in your language:**

https://goodfoodeplus.cebas.csic.es/results/

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# Need for a learning methodology

The Learning Methodology is developed to realize activities that make students active part in the learning process and attract them

- STEM
- food themes

The Learning Methodology is based on effective learning methodologies:

- Inquiry Based Learning
- Project Based Learning

+ interdisciplinary approach between STEAM subjects (Science, Technology, Engineering, Art, Maths)

**Access to the Methodology in English:**

https://goodfoodeplus.cebas.csic.es/pr1-learning-methodology/

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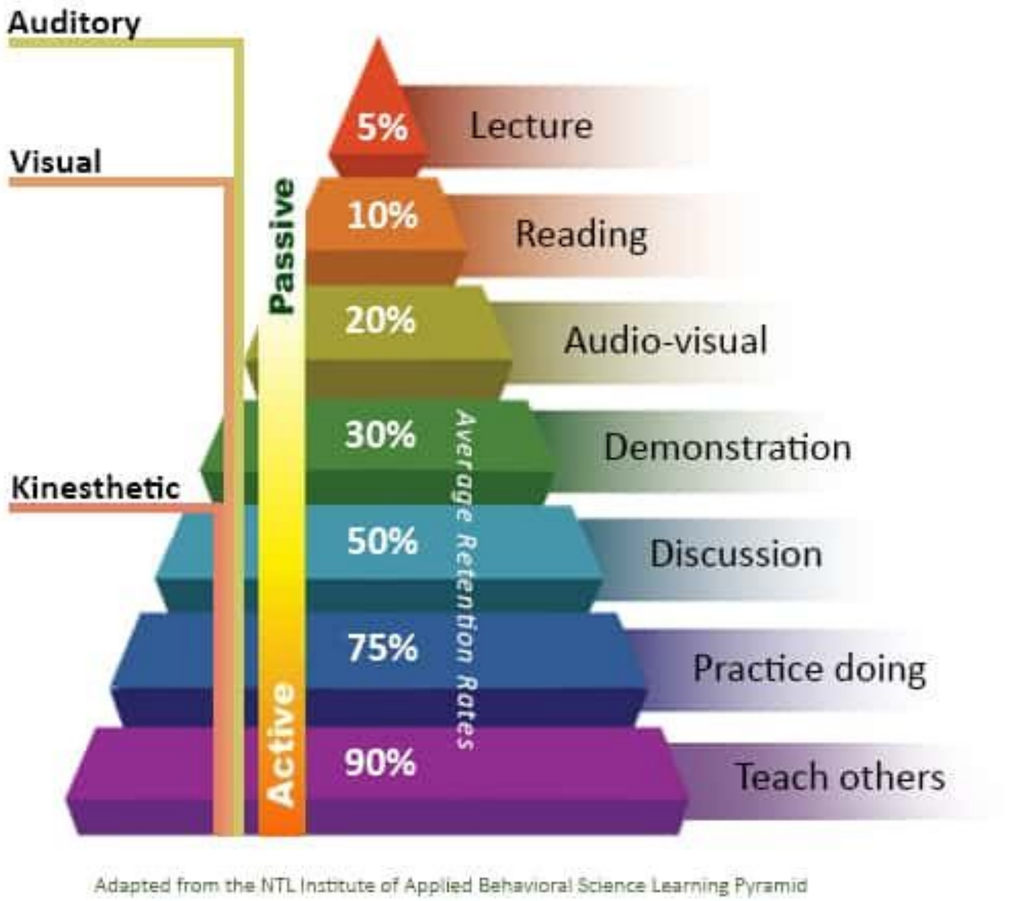
# The pyramid of learning




Adapted from the NTL Institute of Applied Behavioral Science Learning Pyramid

**Access to the Methodology in English:**

https://goodfoodeplus.cebas.csic.es/pr1-learning-methodology/

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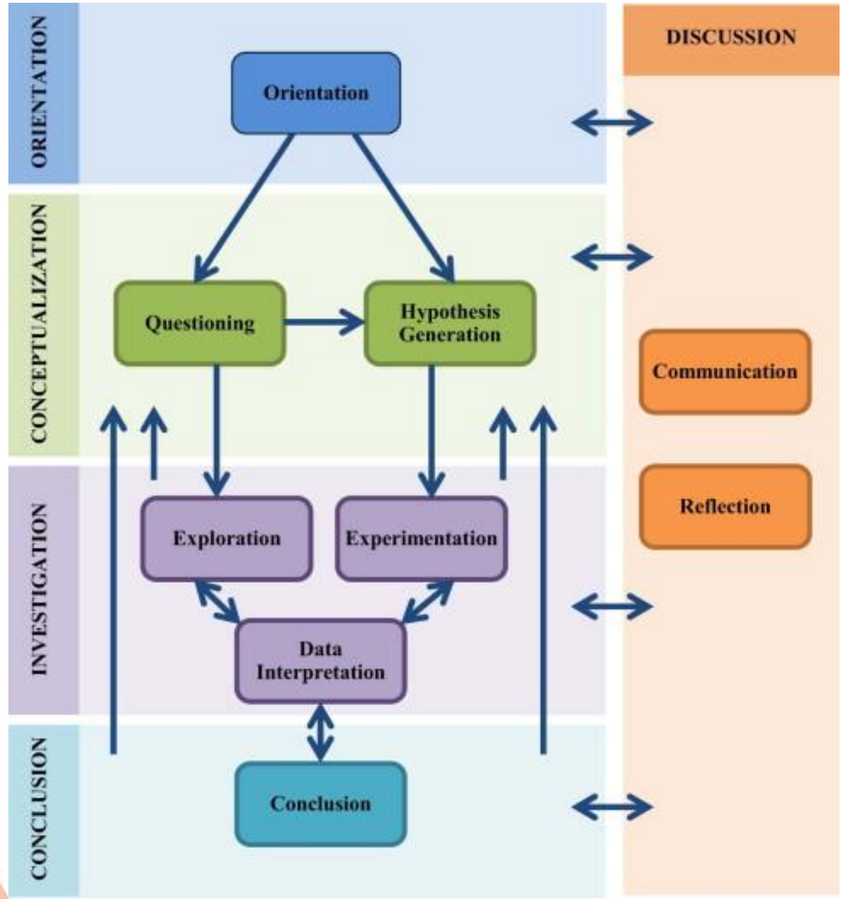
# Inquiry Based Learning




IBL places students at the center of the learning process (more or less guided by the teacher) and it is organized into 5 phases:

- Orientation
- Conceptualization
- Experimentation
- Conclusion
- Discussion (transversal)

*Pedaste et al., 2015*

**Access to the Methodology in English:**

https://goodfoodeplus.cebas.csic.es/pr1-learning-methodology/

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# Project Based Learning

is a teaching method that falls within the student-centered approach, with students completing projects which are usually big projects.

Students

- are engaged in a learning experience in a **meaningful context, real-world,**
- **make own researches, plan and develop an investigation plan,**
- **take data, analyze and** evaluate, **think critically,**
- **m**ake decisions and collaborate with others,
- develop **deep knowledge and skills.**

**Access to the Methodology in English:**

https://goodfoodeplus.cebas.csic.es/pr1-learning-methodology/

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# Integrated STEAM approach

"STEAM" refers to **the integration of arts (A) and creativity in the classical STEM teaching**.

Nowadays, integrated competences are requested in increasingly work sectors. Integrating **STEAM make learning comprehensive, innovative, creative**, **effective** especially **when it is connected to the real world**.

*GOODFOOD promotes **collaborative teaching between different disciplines**, to develop an educational project that covers different perspectives and adds Art to STEM, encouraging creative solutions.*

**Access to the Methodology in English:**

https://goodfoodeplus.cebas.csic.es/pr1-learning-methodology/

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# Themes

**4 Project themes (thematic modules):**

- Sustainable Food Production
- Sustainable Food Availability and Food Selection
- Sustainable food waste management
- Nutritious and Healthy Food Consumption

For each theme, teaching materials are available, such as:

- Learning Units structured according to IBL model
- Resources' Library with Apps, videos and websites

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# Themes

**Sustainable Food Production**

It aims to provide students with the knowledge on the **production methods of the food, the threats of food production to the environment, and familiarise them with sustainable methods** such as conservative agriculture, agroecological practices to reduce the use of chemical fertilisers and pesticides and precision agriculture for the optimisation of irrigation water.

**Learning Units:**

- Sustainable farming methods
- Is your food sustainable?
- Calculate your food Carbon Footprint
- Sustainable fishing

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# Themes

**Sustainable Food Availability and Food Selection**

It includes two aspects:

i) **Sustainable Food Supply** which aims to provide students with the knowledge on sustainable food supply in terms of transportation, packaging, and conservation, stimulating even the invention of solutions that reduce consumption and food transportation, and support the use of green packaging;

ii) **Sustainable Food Selection**: aims to enhance the students' understanding of the different cultural, social, and environmental factors that influence our daily food choices.

**Learning Units:**

- Short food supply chains
- Dietary choices and habits of adolescents

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# Themes

**Sustainable food waste management**

It aims to provide students with the knowledge on different ways to reduce the food losses and waste, by using and transforming bad-looking food and avoiding the disposal of wasted food to landfill.

**Learning Unit:**

- Reuse of leftover

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# Themes

**Nutritious and Healthy Food Consumption**

It aims to increase the students' knowledge/understanding of the **impact of our food habits/choices on our health** and how to improve them. A lifestyle that includes excessive eating and(or) the abuse of highly processed foods (high in fats, sugars, salt, etc) favours the development of overweight/obesity as well as of a range of chronic metabolic disorders which can lead to a number of serious diseases.

**Learning Units:**

- How much salt do we eat?
- The fat component of the diet – the importance of the quality and the quantity of fat in our food
- Improving our knowledge about the concept of antioxidants

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# The book of the methodology

GOODFOOD Learning Methodology:

A step-by-step process to implement the GOODFOOD project at school

Co-funded by the European Union

Summary



2

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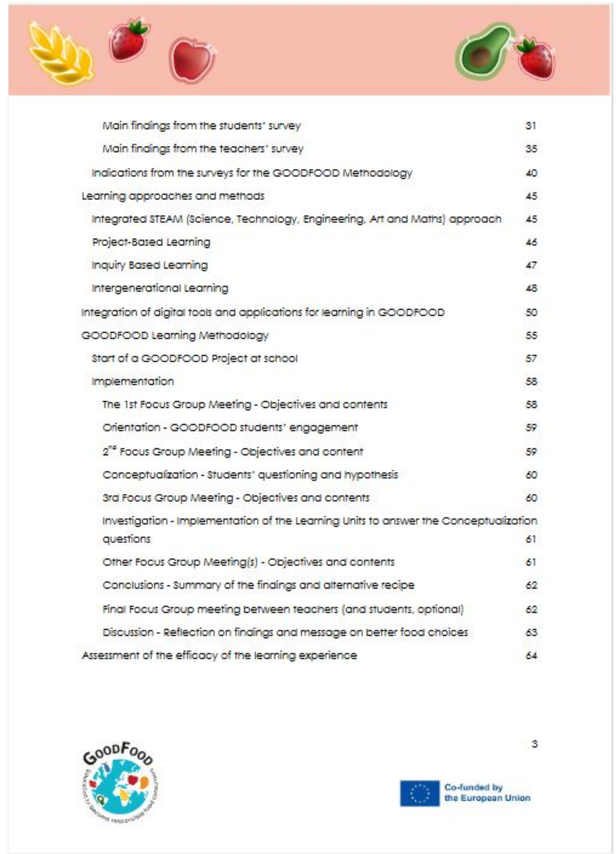



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https://goodfoodeplus.cebas.csic.es/wp-content/uploads/2023/05/GOODFOOD_Methodology_23052023-Final.pdf

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# Roadmap of the learning methodology

## *Project organisation in brief*

Project presentation
Recruit STEAM teachers

Establishment of roles
Establishment of a schedule

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# Roadmap of the learning methodology

## *Organisational flowchart of the activities for the students*

**1. Orientation:**
Think about a dish you like/eat and a dish that your (grand)parents like to cook/offer; then cook it with your peers!

Focus group meeting of teachers

**2. Conceptualization:**
Which food is heathier and more sustainable?
Make your own hypothesis.
What should you know to verify your hypothesis; Which questions should you answer?

Focus group meeting of teachers

**3. Investigations:**
Implement the Learning Units proposed by GOODFOOD,
they may help you to find the answer to your questions.

Focus group meetings of teachers

**4. Conclusions:**
Put together all the findings to verify the initial hypothesis.

Focus group meetings of teachers

**5. Discussion:**
How to improve the dish and make it healthier and more sustainable?
Think about alternative ingredients/processes/supply chains that may improve the quality of the dish.
Write down the alternative recipe and cooked in order to be included in the GOODFOOD Recipes Book.
Prepare a Video Slogan to spread the message on better GOOD FOOD choices!

MORE DETAILS

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# The 1st Focus Group Meeting

**Organizational decisions:**

1) **Creation of the STEAM teachers FOCUS GROUP**
2) **Identification of the teacher-coordinator of the Focus group** who will be the referent of the group.
3) **Selection of the class/es of students**

**Content decisions**

3) **Selection of the Learning Units of the 4 themes** that might be interesting and feasible for the students.
4) **Setting of the learning objectives in each subject**, likely matching the school curriculum

**Logistic decisions**

5) **How / when to start the project with the class**.
6) M**eans of communication** between Focus Group members (e.g., WhatsApp, e-mail, etc.)
7) Set a date for the following meeting and a **preliminary schedule of regular meetings** during the project ongoing.

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1

**INITIAL PHASE WITH THE STUDENTS**

| **Orientation** | **GOODFOOD students' engagement** |
|---|---|
| Where | In classroom and home-work. |
| Aim | **To introduce the GOODFOOD project to the students and stimulate their interest in the thematic modules.** |
| Estimated time: | 2 lessons and homework |
| Organisation | Expected subjects involved: Run by one or more teachers in the same lesson |
| Implementation:<br>In the classroom | The teachers will first:<br>1. Introduce the GOODFOOD to the class (a PowerPoint presentation is available)<br>**2. Ask the students for a dish or a meal they like/eat frequently/would offer to a friend (something representative of their everyday lives or tradition). The dish/meal may consist of one or more dishes e.g., first course, main course, and dessert).**<br>2. Invite the students to split into teams, each team cooks a dish/meal (as homework). |
| Homework (cooking time) | The students - split into teams –<br>1) buy the ingredients and prepare the dish/meal at home (with the support of parents for cooking),<br>2) make a video about the preparation (i.e., how/where accessed the ingredients, used quantities, recipes, taste and look) with the support of the art/technology teacher for video-making. |
| In the classroom | The teams of students, guided by the teacher:<br>1. Present the videos, vote for the dish or meal with the best preparation and details.<br>2. Decide which dish(s)/meal(s) they want to focus on during the Project implementation.<br>3. The Conceptualization phase follows to brainstorm students on the main themes of the project (see Conceptualization). |

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# 2nd Focus Group Meeting

**Report** by the teacher/s involved in the Orientation about :

**the students' experiences on cooking =>** strengths and weaknesses.

**Organizational decisions:**

1) Check and **selection of the Learning Units** (or propose new ones) (all teachers)
2) Set up a **calendar for the implementation of the Learning Units** in the class.

Then, the coordinator will produce the minutes of the meeting.

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2

**2ND PHASE WITH THE STUDENTS**

| **Conceptualization** | **Students' questioning and hypothesis** |
|---|---|
| Where | In classroom |
| Aim | **To set questions and hypotheses on whether and why the selected meal is sustainable and healthy.** |
| Estimated time: | 1 lesson |
| Organisation: | Run by one or more teachers in the same lesson |
| Implementation:<br><br>In classroom | **The teacher will:**<br><br>1) **Ask students whether they think the dish/meal is sustainable and healthy and students formulate the hypothesis and explain why.**<br><br>Students should reflect on the ingredients needed to cook the dish/meal regarding:<br><br>- Origin<br>- Production<br>- Processes<br>- Generated waste and loss<br>- Nutritional aspects<br><br>**The hypothesis can be verified by applying the different Learning Units (see Investigation).**<br><br>Brainstorming may introduce the scope of GOODFOOD: identifying ways to improve the dishes/meals (e.g., to make them more sustainable/healthier/tastier/generating less waste etc.), for instance by changing some ingredients. This is important because the students eventually will create their own recipes with alternative ingredients that improve the quality of the original dishes/meals regarding the investigated themes. |

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# 3rd Focus Group Meeting

**Report** by the teacher/s involved in the Conceptualization about :

the experience of the students on the conceptualization => **strengths and weaknesses**

**Organizational decisions:**

1) Refining of the **schedule** of the programmed activities within the chosen Learning Units (all teachers).
2) D**ecision about any practical aspects** (e.g., logistics, external expert's visit, field visits or others during the Investigation phase

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3

**3RD PHASE WITH THE STUDENTS**

| **Investigation** | **Implementation of the Learning Units to answer the Conceptualization questions** |
|---|---|
| Where | In classroom/Field-trip/Experiments/Bibliographical research |
| Aim | **To explore specific aspects and topics in order to verify the hypothesis or answer the questions** posed in the previous phase, in relation to the food themes. This means implementation of the Learning Units. |
| Estimated time: | Lessons and homework depend on the number of performed Learning Units. |
| Organisation: | Run by the STEAM teachers according to the Learning Units of the relative Module. |
| Implementation:<br>In classroom activity & homework, field trips, laboratory, hands-on etc. | The Learning Units are investigation activities based on IBL structure that will allow students<br>1) to answer the original question or hypothesis with specific activities for each ingredient of the meals/dishes.<br>2) Find alternative ingredients that improve the quality of the dish/meal<br><br>The STEAM teachers can be involved in the implementation of the selected Learning Units, implementing a part or the whole LU: |

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# Other Focus Group Meeting(s)

**Report** by the teacher/s involved in the Investigations by the students about :

the experience of the students => **strengths and weaknesses**

**Organizational decisions:**

1) Organisation of the module(s) and Learning Units implementation (all teachers)
2) Timetable and necessary equipment (al teachers)
3) Preparation of the final outcomes (book of recipes and the video-slogan).

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4

**4TH PHASE WITH THE STUDENTS**

| **Conclusions** | **Summary of the findings and alternative recipe** |
|---|---|
| Where | In classroom and homework |
| Aim | **To gather the findings from all the Project Investigations (Learning Units implementation) and "to design" an alternative Recipe for the selected dishes/meals.** |
| Estimated time: | 2 lessons |
| Organisation: | Run by one or more teachers |
| Implementation:<br><br>Homework and in classroom activity | 1) The students in teams prepare **a presentation of the main findings** obtained from the Investigations (Learning Units). They finally answer the original question (regarding the sustainability and health of the dish/meal etc.) and validate the hypothesis formulated in the Conceptualization.<br><br>2) They report own opinion about alternative ingredients/methods that can improve the quality of the selected dishes/meals.<br><br>3) Based on the alternative ingredients, the students design the new GOODFOOD Recipes of the selected dishes/meals for the final book. |

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## Final Focus Group meeting between teachers (and students, optional)

**Report** by the teacher/s involved in the Investigations by the students about :

the experience of the students => **strengths and weaknesses**

**Organizational decisions:**

1) Planning **of the final phase** (Discussion)
2) Promotion of the **final outcomes** produced by the students

Class representatives can be invited to the meeting if necessary.

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**5TH PHASE WITH THE STUDENTS**

| **Discussion** | **Reflection on findings and message on better food choices** |
|---|---|
| Where | In classroom activity, homework, public event |
| Aim | • **To test the alternative Recipes, prepare them and describe them in the Recipe Book,**<br>• **To prepare a Video Slogan**<br>• **Share the Project's outcomes with a wider audience.** |
| Estimated time: | 2 lessons and homework |
| Organisation: | Run by one or more teachers |
| Implementation:<br>Homework<br><br>In classroom activity<br><br>**Event** | 1. The students split into teams cook the dishes of the new GOODFOOD Recipes and report on the experience,<br>2. The students prepare the description of the new Recipe for the GOODFOOD Recipe book and complement it with drawings, images, photos, videos etc.<br>3. The students prepare a Video Slogan for GOODFOOD<br>4. The students create a presentation of their project experience and findings, as well as their alternative Recipes, and present to a wider audience in an event at their school and/or their local community and beyond at the GOODFOOD conference and/or other events on the themes. |

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# Thanks!

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# Thematic module: Sustainable food production

Francesca Ugolini & Silvia Baronti
Institute of Bioeconomy – National Research Council

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**Food source Vs. Environmental threats**

What does **sustainable food production** mean?

A) Sustaining farmers in own place, promoting the use of own resources in the food production rather than using external inputs.

B) Making a wise use of natural resources and environment in a way that it can satisfy community's needs without compromising the satisfaction of the needs of future generations.

C) Protecting the environment, limiting the use of natural resources.

The concept of sustainability was firstly annouced in 1992 at the UN Conference in Rio de Janeiro.
*"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*

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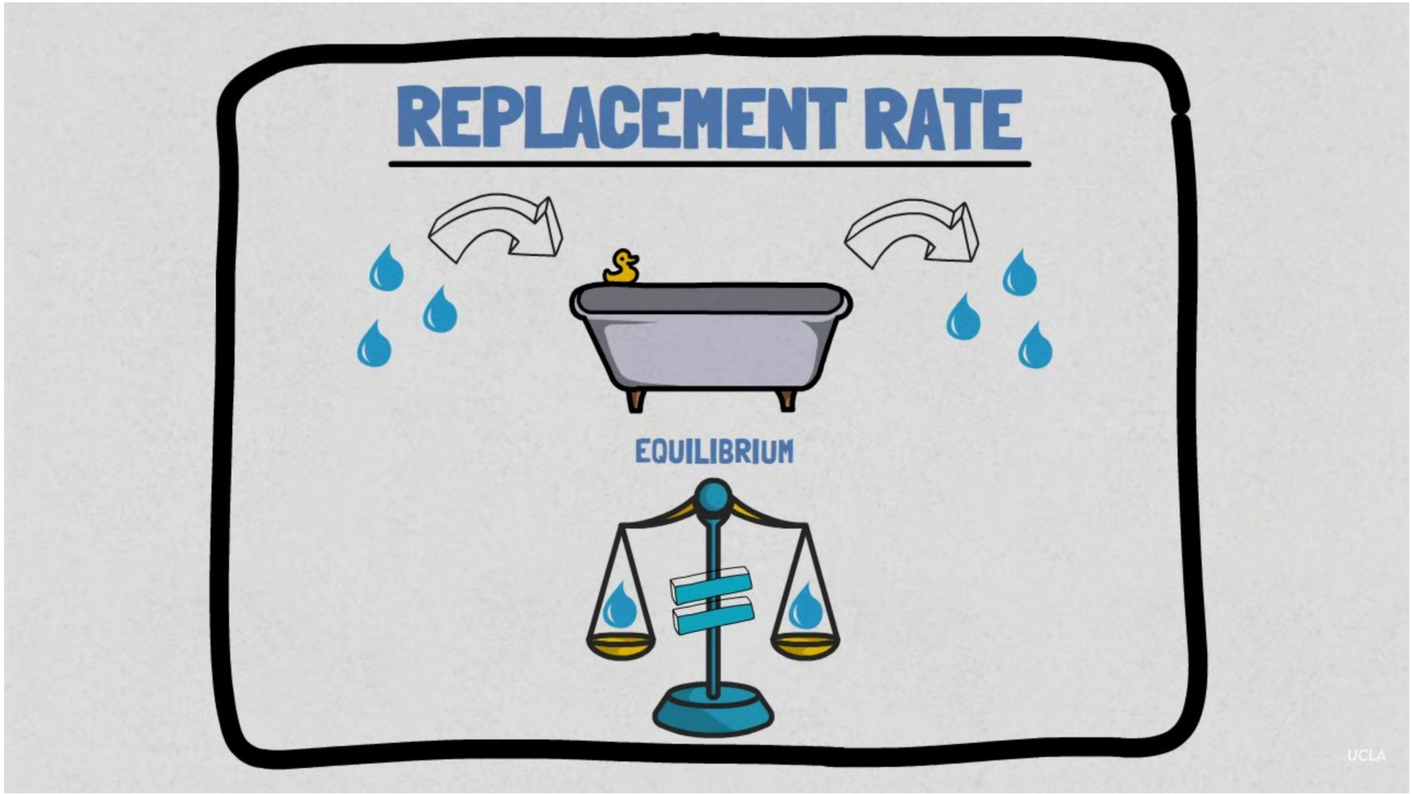


Sustainability
https://www.sustain.ucla.edu/what-is-sustainability/
https://youtu.be/zx04Kl8y4dE

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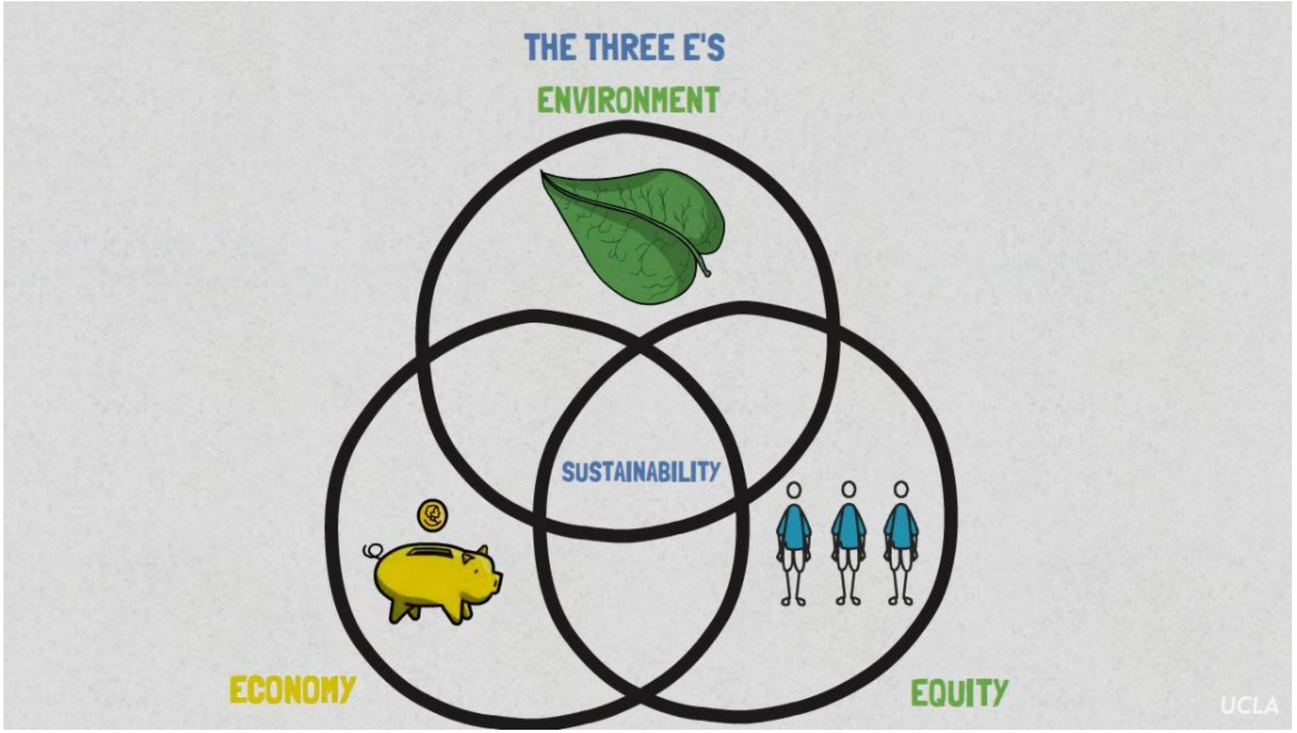


Sustainability
https://www.sustain.ucla.edu/what-is-sustainability/
https://youtu.be/zx04Kl8y4dE

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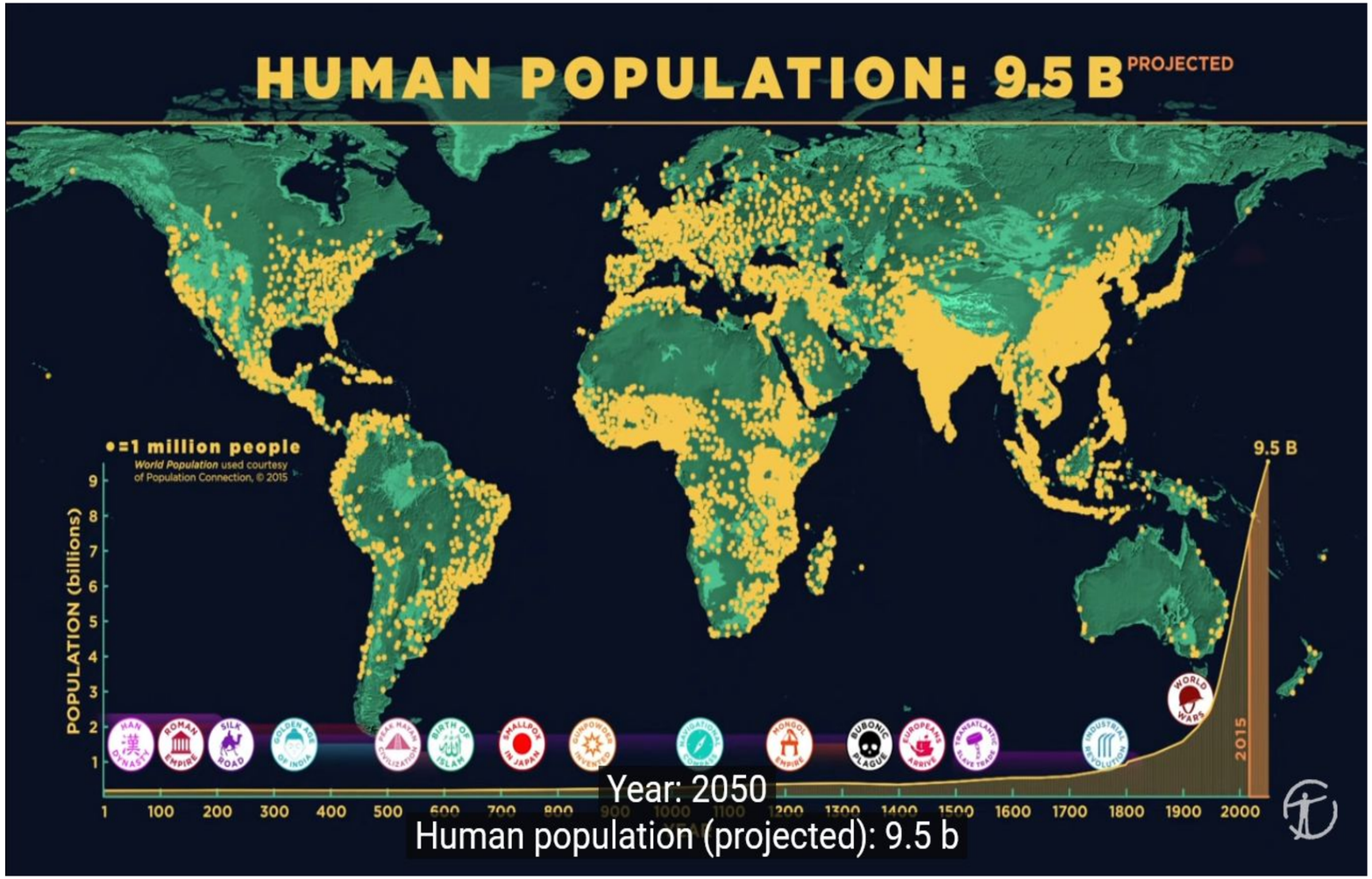
# Challenges for the Earth – human population increase



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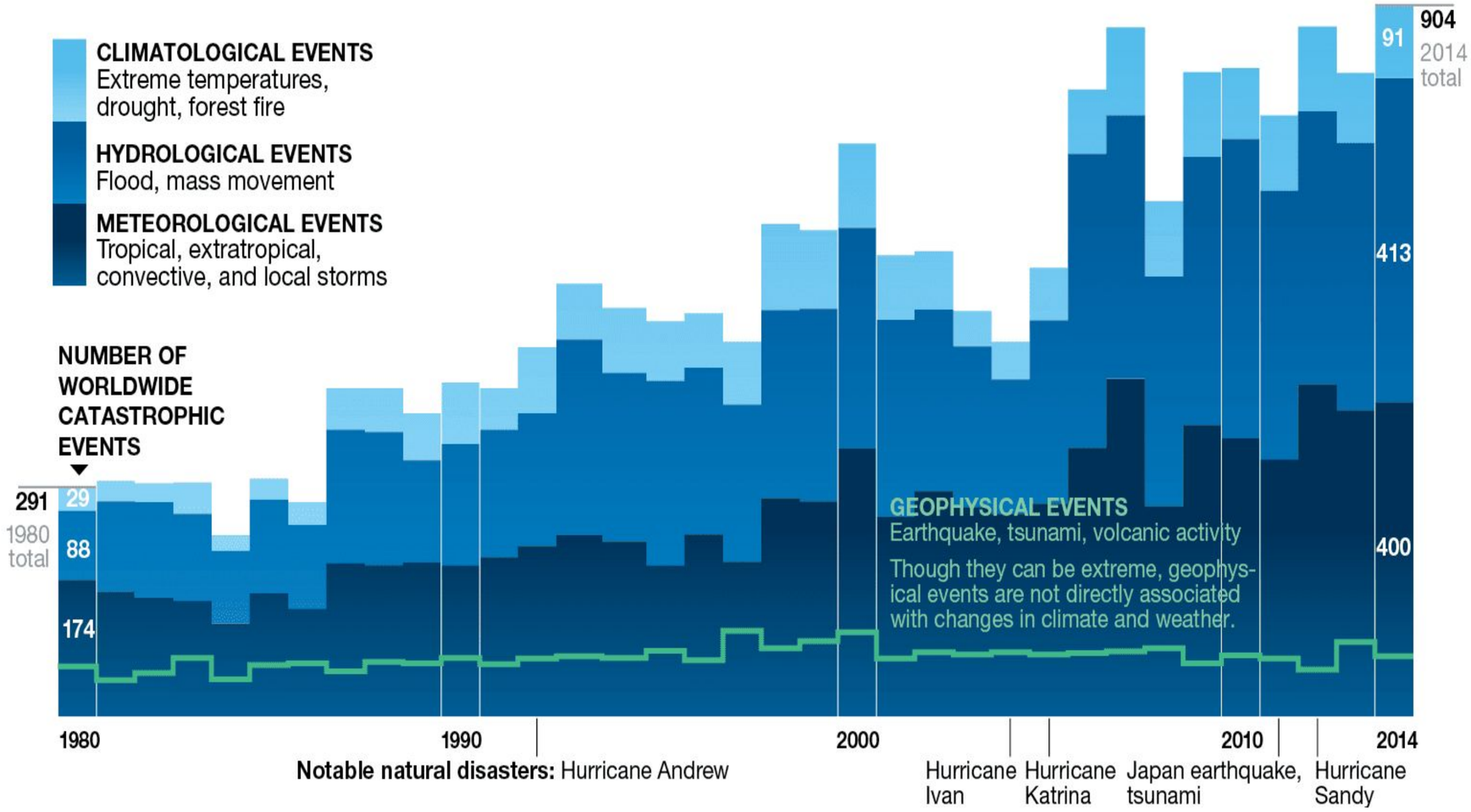
# Challenges for the Earth – climate change due to the exacerbated greenhouse effect that generates global warming



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# Population must be fed

**FOOD SYSTEMS**

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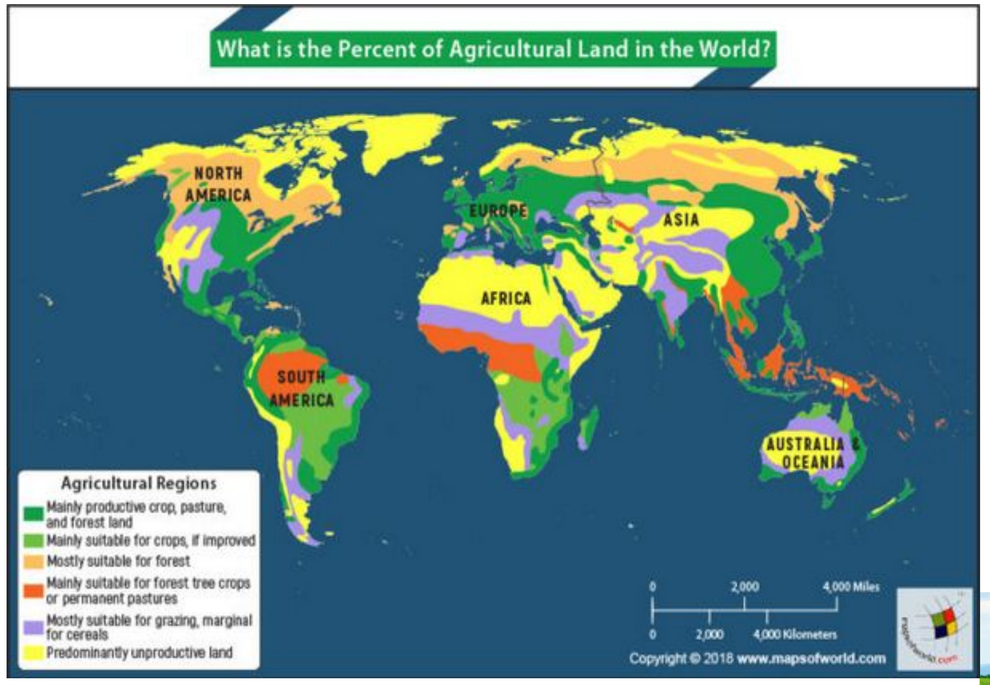
# Only 38% of land can be used for agriculture




134,1 Mkm² global land surface

38% - agricolture (crops and pastures)
30% - forests
22% - other areas (shrubs, tundra,desert)

**Permanent crops 3%**
(fruit trees)

**Crops- 27%**
(temporary productions, crops)

**Permanent pastures -70%**
(grasslands – natural and managed)

**Table 1: Global Use of Land: from ages of 'undisturbed' until today** (in Mkm²)

| | Forest | Steppe | Shrubs | Tundra, Desert | Cropland | Pasture | Total |
|---|---|---|---|---|---|---|---|
| Undisturbed | 58.6 | 34.3 | 9.8 | 31.4 | 0.0 | 0.0 | 134.1 |
| 1700 | 54.4 | 32.1 | 6.8 | 31.1 | 2.7 | 5.2 | 134.1 |
| 1990 | 41.5 | 17.5 | 2.5 | 26.9 | 19.7 | 31.0 | 134.1 |

Source: Klein Goldewijk & Battjes (1997)

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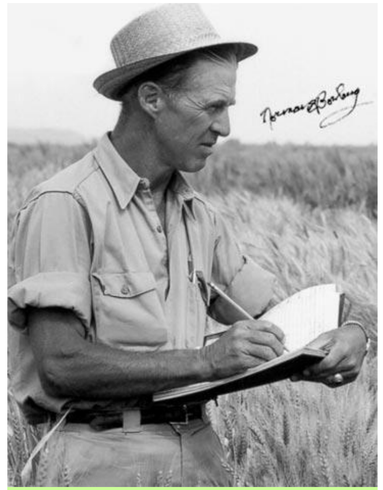
# Green Revolution

**Today, agriculture is mainly based on the use of external inputs that were formerly studied and introduced in the production system with the GREEN REVOLUTION to satisfy the population growth in the 1960ies.**

**BUT IT IS NOT “GREEN”**

Norman Borlaug in 1970 got the Nobel Prize for Peace, for the increase of food production.

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# Intensive agriculture

SOY – 1/5 of the soy European market is produced by the cultivations in Brasil responsble for the Amazon forest cuttings

Corn Belt- America

Tomato crop in Xinjiang, China. This the widest productive area and tomatoes are sold all over the world, also for the ketchup by Heinz.

**Characteristics:**

- Specialized productions
- Monoculture to simplify the operations
- Extend on huge surfaces
- Use machineries
- Highly productive
- High external inputs (fertilizers, chemical pesticides
- Avoid obstacles (e.g. trees)

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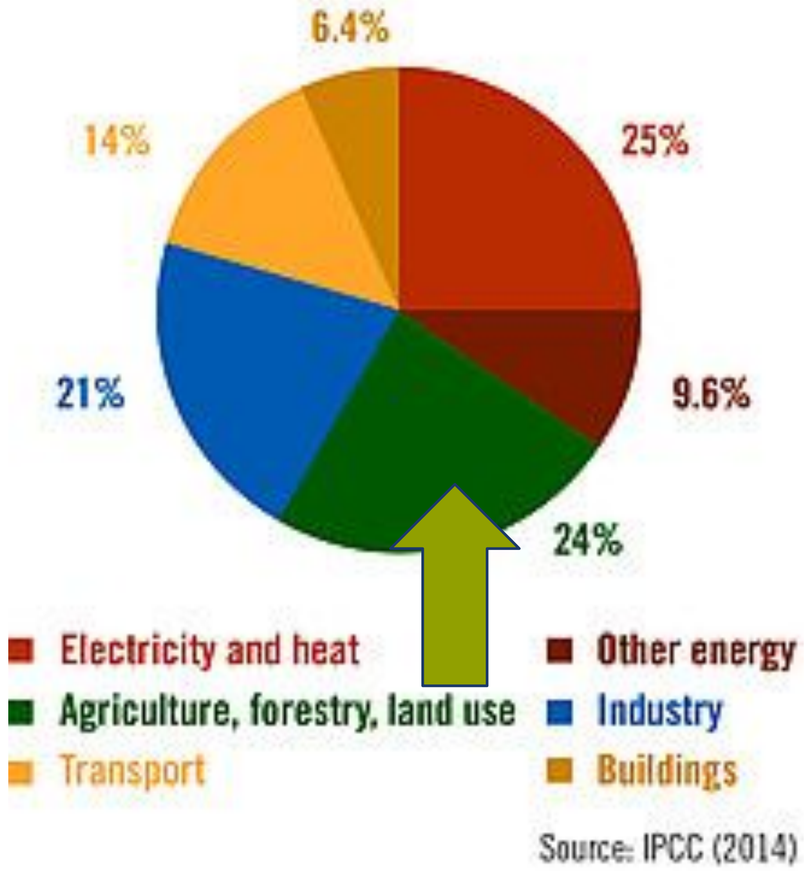
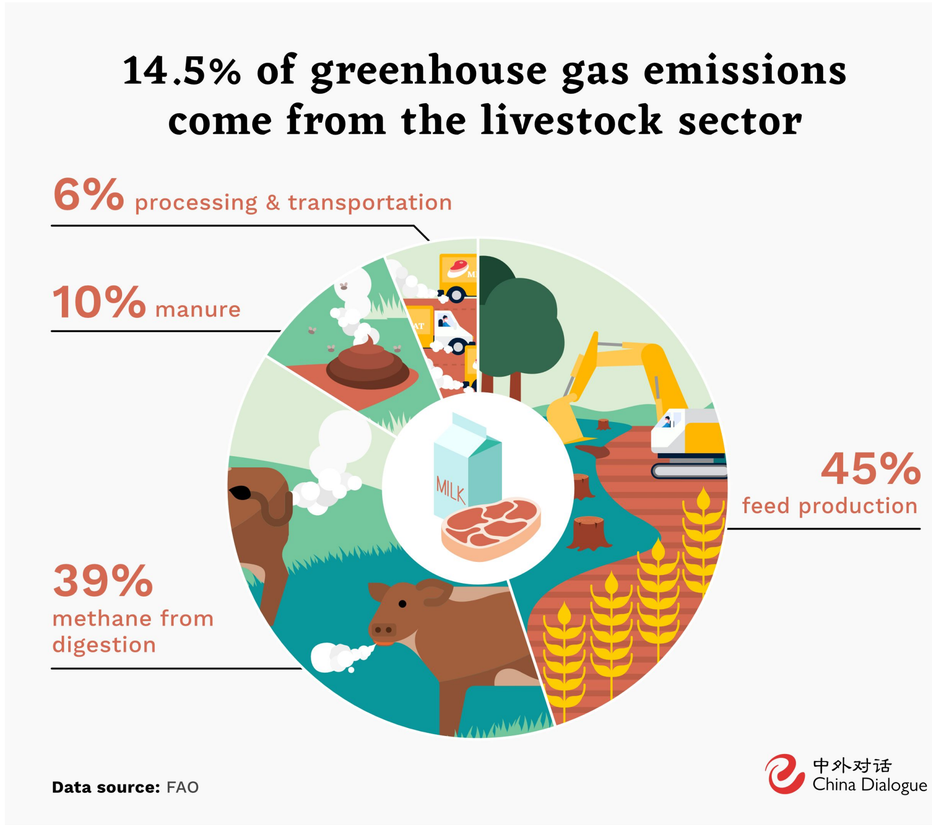
# Contribution of agriculture to greenhouse gases emissions into the atmosphere

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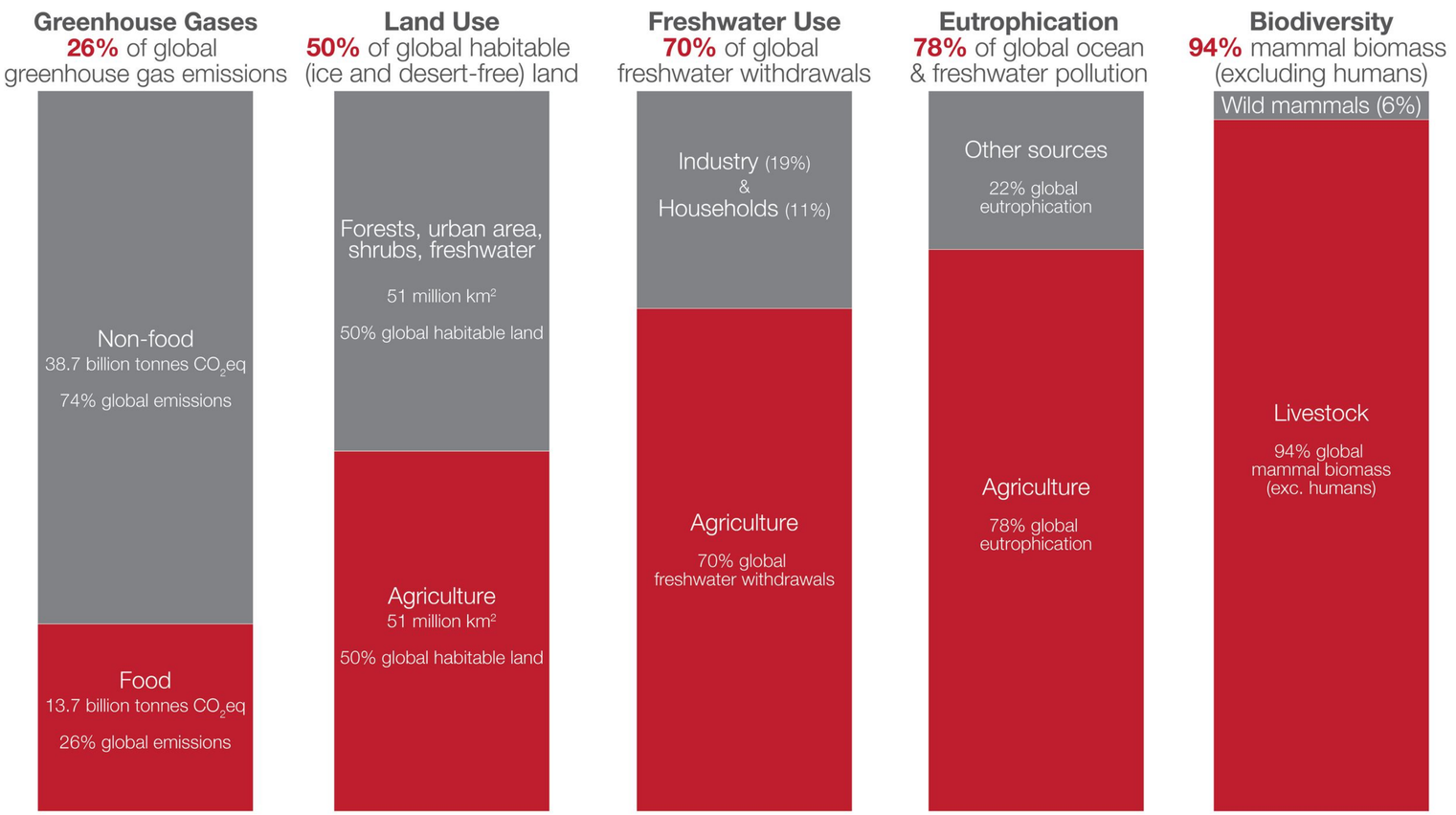
# Impacts of agriculture on the environment

## What are the environmental impacts of food and agriculture?

Our World in Data




Data sources: Poore & Nemecek (2018); UN FAO; UN AQUASTAT; Bar-On et al. (2018).
OurWorldinData.org – Research and data to make progress against the world's largest problems.

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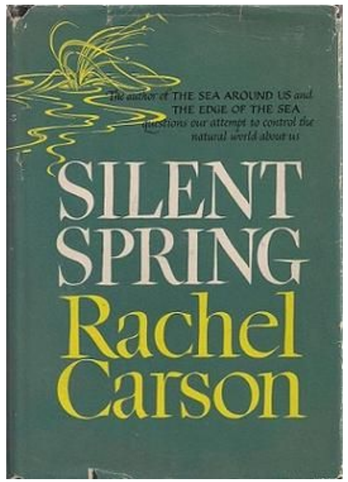
# Raise of environmental awareness

1960 – Silent Spring

Rachel Carson (1962) the book is the start of the environmental movement!




Since then, some pesticides were banned (e.g. DDT).

1970 – First *Earth Day*

20 millions of young americans demonstrated for ecolological reforms. In the same year, the *Environmental Protection Agency* (EPA) was founded.

Shiva blames multinationals to push farmers to use highly productive cultivars and monocultures. Biodiversity declines as the variety of local species and cultivars (often more resilient to ecological conditions) disappears.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# Intensive Vs. Sustainable agriculture

## INTENSIVE

### Competitive agriculture

1. No/Low cooperation between farmers
2. No tradition/local culture
3. High profit
4. High quantity

### Specialization

1. Low genetic variability
2. Monocultures
3. Distance between cattle and crop farming
4. Standardize productions
5. Specialized machineries

## SUSTAINABLE

### Community agriculture

1. More cooperation between farmers
2. Greater respect of rural traditions
3. Agricuture as life style
4. Quality/landscape protection

### Diversity

1. Large genetic variability
2. Associations between plant species
3. Integration between cattle and crop farming
4. Production methods adapted to the local conditions
5. Interdisciplinary systems

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# Practices for sustainable agriculture

## Practices for sustainable crop farming

*Sod seeding*

https://www.informatoreagrario.it/wp-content/uploads/2020/11/semina-su-sodo.jp

*Agroecology: legumes and corn*

*Permaculture*

*Alley cropping systems in agroforestry*

*Organic amendments (e.g., biochar, manure)*

*Organic mulching*

**Conservation agriculture** aims to produce by enhancing the soil nutrients: minimum tillage cover crops and diversification of the species and productions are the main pillars on which it funds.

*Precision agriculture with agrometeorological stations with remote sensing technology*

## Practices for sustainable livestock farming

*Rotational grazing*

*Silvo-pastural systems*

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# Sustainable agriculture

Organic agriculture is defined as
*"a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasises the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system*." (FAO/WHO Codex Alimentarius Commission, 1999).

SISTEMA DI QUALITÀ NAZIONALE
PRODUZIONE INTEGRATA

***National Quality System SQNPI***
*SQNPI is a certification scheme which has as a target to add value to the vegetal agriculture productions obtained in compliance with the Regional* ***Integrated Crop Management Guidelines****, and it is recognized on a European level (Eu Reg. 1974/2006).*

***Integrated crop managment***
*The integrated crop or agriculture management is a voluntary production system which is realized when the technical norms foreseen for any kind of colture are observed for both the defense from all odds, and for all other agronomic practices such as fertilisation and irrigation.*

**All ecolabels in Europe**
https://www.ecolabelindex.com/ecolabels/?st=region=europe
CCPB – Certifying agency
https://www.ccpb.it/en/about-us/

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# GOOD FOOD is needed


**Food is linked to many of the 17 Sustainable Development Goals**

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# LEARNING UNIT

# Calculate your food Carbon Footprint

## Brief description

*This Learning Unit aims to assess the impact of food using calculators to measure the carbon footprint (carbon dioxide and other GHG expressed as CO2 equivalent) of the food.*

*Carbon Footprint calculators are based on database in which the amount of $CO_2$ per kilo of product is usually indicative as it may vary substantially with the typology of production and all following processes.*

*Despite many limitations, the Carbon Footprint is a way to immediately be aware about the environmental impact of food and reflect on how the*

## Learning Objectives

Students will learn about:

✔ Carbon Footprint

✔ Agriculture as source of Greenhouse Gases

✔ Conventional vs. sustainable production methods

✔ Food supply chain and distance of production (means of transportation)

✔ Alternative ingredients

## Subjects: science, technology, other?

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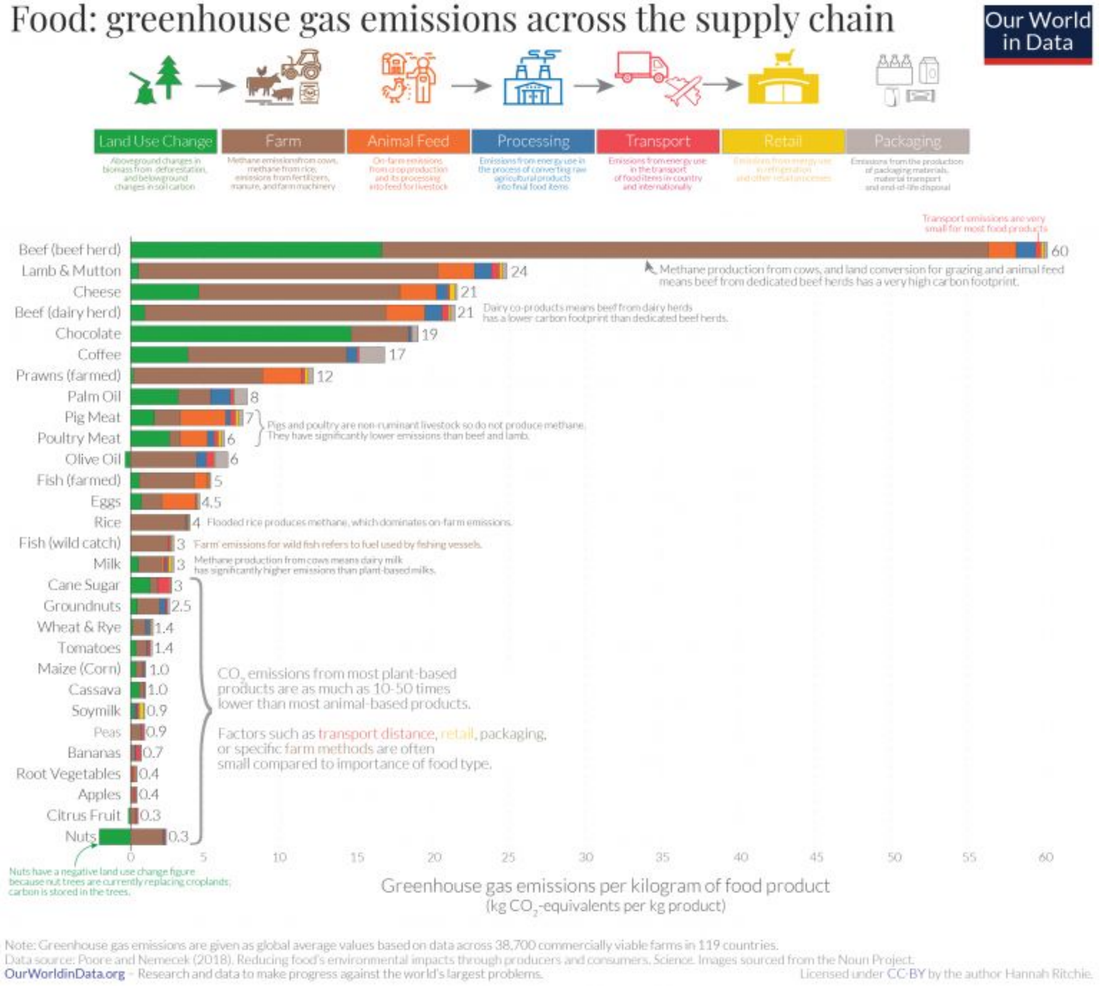
# Carbon footprint




Total amount of carbon dioxide ($CO_2$) and other greenhouse gases emissions such as methane ($CH_4$) and nitrous oxide ($N_2O$), that are linked to the object, person or system or activity, **calculated as carbon dioxide equivalent** using the relevant 100-year global warming potential (GWP100).

The **carbon footprint for food products** takes into consideration all the processes behind the production and the delivery of any single component.

Food contributes 10-30% of a household's carbon footprint, mainly attributed to the **agricultural practices** used to produce it and the **transportation**.

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***Watch the video about the cattle's GHG production***

***https://www.bbc.com/news/av-embeds/49238749/vpid/p06t0hfx***

**5'**

**Orientation**

***Have you ever thought about the amount of $CO_2$ hidden in your meal?***


**Subjects: science, technology, English, other**

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***To what extent does your chosen food have an impact on the environment?***

***What is the most polluting ingredient?***

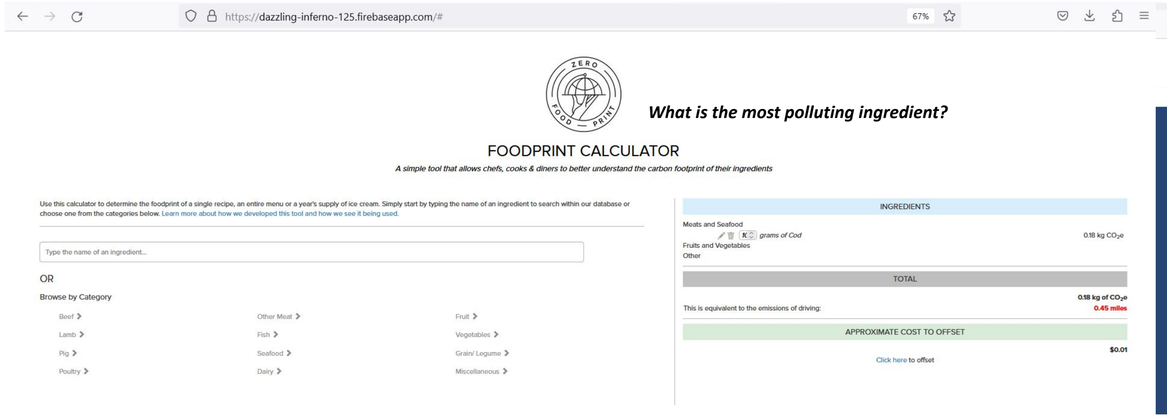
***How to know it?***

*There are Apps for the  calculation of the Carbon Footprint.*

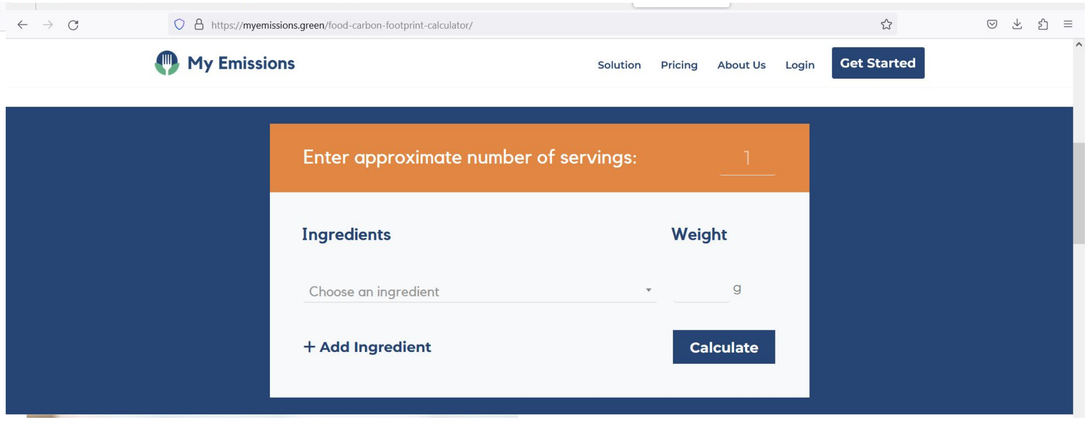
**5’**

**Conceptualization**

https://dazzling-inferno-125.firebaseapp.com/#




https://myemissions.green/food-carbon-footprint-calculator/




**Subjects: science, technology, math, other**

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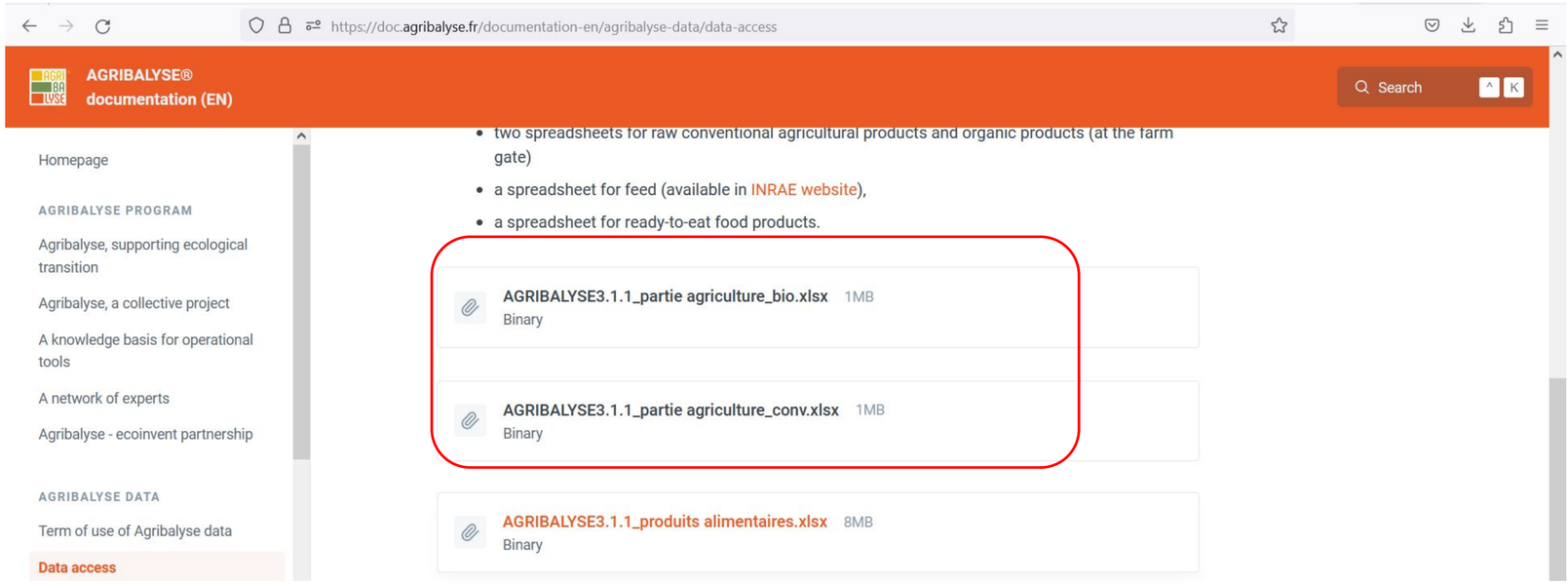
https://doc.agribalyse.fr/documentation-en/agribalyse-data/data-access




**5’**

**Conceptualization**

**Subjects: science, technology, math, other**

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*Split into teams,*
*Search for the recipe of your food, each team investigates one (or more) ingredient(s).*

**Gazpacho de sandía**
Se lo considera ligado a las **sopas frías previas al descubrimiento** del continente americano, que usaban como base ingredientes diferentes al tomate, por entonces desconocido. El gazpacho de sandía estándar tiene los siguientes ingredientes:

- *400 gramos de sandía sin pepitas y sin piel 400g*
- *dos tomates tipo pera maduros (opcional; se añade para reforzar el sabor) 310 g*
- *Un cuarto de cebolla 45 g*
- *un pepino pequeño pelado 110 g*
- *un cuarto de pimiento rojo 35 g*
- *50 gramos de pan duro 50 g*
- *50 mililitros de aceite de oliva virgen extra 40 g*
- *Sal, pimienta, vinagre a gusto*
- *dos vasos de agua 400 g*

**15’**

**Investigation**


1) *Weigh the ingredients of your recipe (use IS for weight, i.e. kg or grams)*
2) *Read any information on the food package on how the ingredient has been produced, the distance of the production site.*

**Subjects: science, technology, math , other**

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*2) Use an App for the Carbon Footprint assessment e.g., "My Emissions"* https://myemissions.green/food-carbon-footprint-calculator/.
*This allows to calculate food Carbon Footprint per kilo of product (CO2 eq/kg) and the database is pretty rich. However, unit values are likely based on US conventional practices for food production.*
*You can also use the databases at this link:* https://doc.agribalyse.fr/documentation-en/agribalyse-data/data-access *to compare foods from conventional vs. organic production.*

**$CO_2$eq. of your ingredient = ……**

**Subjects: science, technology, math, other**

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15’

Conclusions

***1) Sum the Carbon Footprint values of all the ingredients of the food/meal to calculate the final one.***

- **TOTAL CO2eq. =** *sandía (400g) = 140 g CO2eq*
- *dos tomates tipo pera maduros (310 g) = 110 gCO2eq*
- *Un cuarto de cebolla (45 g)= 20 gCO2eq*
- *un pepino pequeño pelado (110 g) = 40 gCO2 eq*
- *un cuarto de pimiento rojo (35 g)= 40 gCO2 eq*
- *50 gramos de pan duro 50 g = 50 gCO2eq*
- *50 mililitros de aceite de oliva virgen extra (40 g) = 320 gCO2eq*
- *Sal, pimienta, vinagre a gusto*
- *dos vasos de agua 400 g*

***2) Answer these questions:***

- ***720 g CO2eq***

***What is the ingredient with the greatest carbon footprint?***
***What is the ingredient with the least carbon footprint?***

***Why?***

**Subjects: science, technology, math, other**

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## *What can you do to reduce the Carbon Footprint of your food?*

15’

**Discussion**

Replace the most impacting ingredients to reduce the Carbon Footprint of the dish/meal on the basis of:

- Production methods
- Distance of production and preparation
- Type of ingredient (e.g., changing one ingredient with other one less impacting)

*The alternative ingredients will be used for the “more sustainable version of the recipes” which will be tested in the Conclusion and Discussion phase of the Project.*

*Students may also prepare a quiz for their peers to guess the Carbon Footprint between different dishes.*


**Subjects: science, technology, math, other**

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# LEARNING UNIT

# Is your food sustainable?

## Brief description

*This Learning Unit stimulates students to associate the concept of sustainability to food choices and know more about production systems.*

*Students will analyse the labels on the products (ingredients) / interview producers and sellers to understand if the product is (or not) sustainable.*

*They will search information about the criteria of sustainability behind the label / slogan and know more about production methods.*

## Learning Objectives

Students will learn about:

- ✔ Environmental sustainability in agriculture
- ✔ Food labels regarding sustainable productions
- ✔ Impacts of food production on the environment
- ✔ Sustainable practices in food production
- ✔ Regenerative agriculture

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***1) Watch one of these videos or brainstorm on the impacts of Agricultural Practices on the Environment***

*https://youtu.be/dbEtcjNxGVQ*

*https://youtu.be/MnLGUxhL2JI*

**10’**

**Orientation**

*Based on the video or/and on other sources (ppt) and knowledge*

- ***list** the **environmental impacts** of agriculture on the environment*
- ***list** the **solutions** to make **agriculture more sustainable***

https://jamboard.google.com/d/1Y_bigvB8Tc9UeWDLxhBhUpwNKY5pLJQIsd8oI0B_ipI/edit?usp=sharing

**Subjects: science, technology, economy, English, literature, geography, other**

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*QUESTION/HYPOTHESIS*

*Regarding* ***the chosen food/meal - Do you consider it sustainable?***

***How would you do to know it?***

*Hints:*

- *Does it come from industrial conventional agriculture?*
- *Is it organic?*

**5’**

**Conceptualization**

**Subjects: science, technology, economy, English, literature, geography, other**

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## *1) Search for the food/meal recipes and find out the ingredients and the way they can be produced (market's offers)*

*Split into teams, each team choose one or more ingredient/produce.*

**30'**

**Investigation**


**Figure 2:** A few eco-labels

https://www.semanticscholar.org/paper/Steps-in-the-Right-Direction%3A-Understanding-Food-Gossenberger-H%C3%A4rnby/f4cc36b2b69a13ccea599b8528b2fa9db2b8b0a8

(a)


(b)

(a) EU organic label (environmental sustainability). Regulation EU 2018/848 of the European Parliament and of the Council of 30 May 2018; (b) PGI label (socioeconomic sustainability). Regulation EU 1151/2012 of the European Parliament and of the Council of 21 November 2012.

*Some links where you can find information about the labels*
https://www.ecolabelindex.com/ecolabels/
https://www.europarl.europa.eu/RegData/etudes/STUD/2022/699633/IPOL_STU(2022)699633_EN.pdf
https://www.moving-h2020.eu/farm-certification-schemes-for-sustainable-agriculture-specifications-for-origin-and-quality-of-the-final-products/
A Review of Eco-labels and their Economic Impact https://hal.inrae.fr/hal-02628579/document

**Subjects: science, technology, economy, English, literature, geography, other**

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## *2) Find any information on the labels or by interviewing the seller and on the internet about the way it has been produced and fill-in the table.*

*Make a bibliographical research about the meaning of the label (if no information is reported, consider the produce from intensive industrial production system) and any information that you can find about the production method.*

**30’**

**Investigation**

| Produce or ingredient | Does it report any label of sustainability? If yes, which one? | Where was it produced? | Does it report any slogan on sustainability? any information about the way it is produced? (e.g., without the use of chemical pesticides, fertilizers, no genetically modified, produced in an environmentally friendly way etc. |
|---|---|---|---|
| | | | |

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***All teams gather the information found for each ingredient of the dish/meal.***

| Produce or ingredient | Does it report any label of sustainability? If yes, which one? | Where was it produced? | Does it report any slogan on sustainability? any information about the way it is produced? (e.g., without the use of chemical pesticides, fertilizers, no genetically modified, produced in an environmentally friendly way etc. |
|---|---|---|---|
| | | | |

**30’**

**Conclusions**

***Answer the questions:***

- ***How many ingredients of your food are produced in a sustainable way?***
- ***How would you rate the market’s offer in terms of sustainability?***
- ***What do you think about the information on sustainability reported on the package?***
- ***Which is the ingredient produced farther?***

**Subjects: science, technology, economy, English, literature, geography, other**

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1) ***Within 5 minutes, provide the highest number of solutions to improve the sustainability of the food/meal. No matter if the ideas are silly.***
2) ***Choose one solution(s) to make the food more sustainable***

**15’**

**Discussion**

Replace the most impacting ingredients to improve the sustainability of the food on the basis of:

- Production methods
- Distance of production and preparation
- Type of ingredient (e.g., changing one ingredient with other one less impacting)

*The alternative ingredients will be used for the “more sustainable version of the recipes” which will be tested in the Conclusion and Discussion phase of the Project.*

**Subjects: science, technology, economy, English, literature, geography, other**

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# Sustainable food waste management

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# The reuse of leftover food

By applying this Learning Units, the students investigate how to reuse food leftover, taking into consideration the hedonic factor and evaluating the environmental sustainability.

Students will learn about:
✔ food education on the value of the diet based on unprocessed raw materials
✔ basic elements for cooking
✔ culinary traditions and culture

Students will be in a position to:
✔ Create a digital survey
✔ interview people to obtain complete information
✔ manage leftover food
✔ choose the healthiest way to cook leftover food
✔ Prepare a new recipe with leftover

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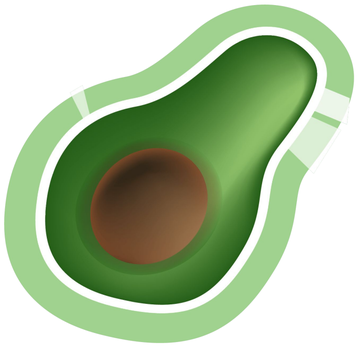
GOODFOOD
Education to become responsible food consumers

## Nearly half of waste food comes from households

Some of the reasons people waste food in their homes is by cooking too much and forgetting about or not eating up their leftovers. Here are almost six ways to prevent wasted food by tackling your leftovers.

## How often do you throw leftover food in the trash?



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# Do you know what's in your refrigerator?

When you open the fridge looking for something to eat, do you carefully check the things it can offer you?

Do you always remember if there is anything good left over from previous meals?

## How does your family manage leftovers?

**Let's comment on the following advice together**

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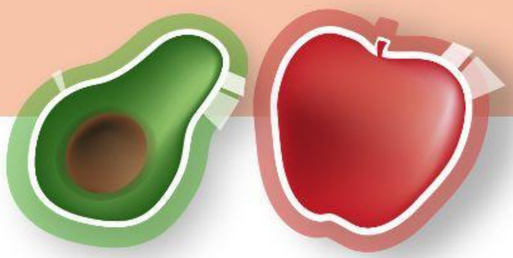

**Don’t throw them out** → After a home-cooked meal, pack up the leftovers and get them into the fridge after everyone has filled up. Store them in a place in the fridge where you won’t forget about them.

**Make them tomorrow’s lunch** → Saving leftovers is a quick way to pack a low-effort lunch. Just pop them into the right-sized container, and you’re ready to go! If there is not enough food for a full meal, pack an extra snack or a side.

**Reinvent them** → Get creative in the kitchen. Leftover vegetables are easily combined or baked into new dishes. Reinvent grains and meats into fried rice, hash, scrambles, and soups. The web is filled with ideas on “what to do with extra …”

**Prevent them** → If you really hate leftovers, make an effort to avoid them in the first place by matching the amount of food you cook or buy with the amount of food you eat. Use a portion calculator when you cook, especially if you’re trying something new. If you are out at a restaurant and eating something that doesn’t store well, split it with a partner or friend. You might even get bold and request a half-serving or smaller portion!

Making sure we eat all of the food we prepare is an important way to reduce waste, conserve resources, and save money. Start showing your leftovers some love today.

from https://www.hennepin.us/choose-to-reuse/tips/leftover-ideas

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# Which leftovers do you cook?

Let's shearing ideas and make a list of the leftover you prefer to eat the day after.

Let’s share ideas by making a list of the leftovers you usually eat the next day.

Do you cook or only reheat leftovers? How do you do it?

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**In addition to recipes from different cultures, some recipes that were cooked less than a century ago can also be very interesting**

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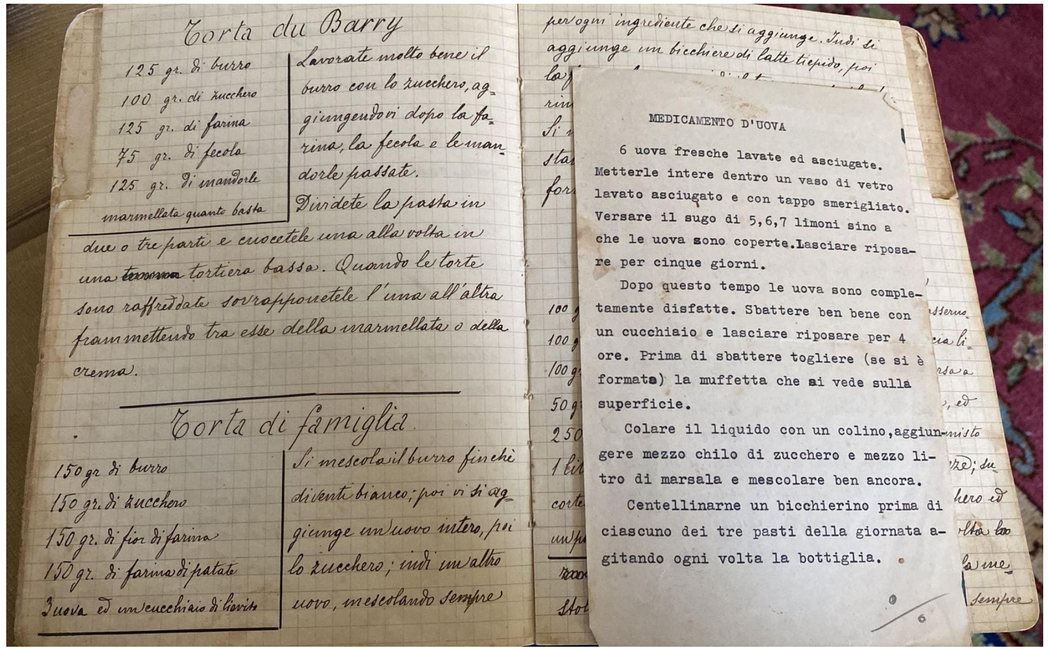


## Egg medicine

6 fresh eggs, washed and dried, place them whole in a washed, dried glass jar with a frosted cap. Pour the sauce of five, six, seven lemons until the eggs are covered and leave them to rest for five days. After this time the eggs are completely broken, beat well with a spoon and leave to rest for four hours. Before whisking, remove any mold visible on the surface, if it has formed. Strain the liquid through a sieve, add half a kilo of sugar and half a liter of Marsala and mix well again. Sip a small glass before each of the three meals of the day, shaking the bottle each time

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# The Learning Unit on
# The reuse of leftover food
# is in

https://docs.google.com/document/d/1CKLNLyNApOWi8LbSueY7IB4eorOT4mvB/edit?usp=drive_link&ouid=117919987869015484455&rtpof=true&sd=true

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# Food packaging

Refining knowledge of the materials used and their environmental impact serves to address the issue of waste and find alternative solutions for cooking without creating waste.

Students will learn about:
✔ Chemistry of packaging materials (Tetra Pack, different type of plastic, paper, glass, wood)

Students will be in a position to:
✔ choose the best way to reduce the produce of waste in the kitchen

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We would like to prepare a gazpacho...

How many and what different materials do we bring home by buying 5 tomatoes, 1 onion and 2 cucumbers?

**How can we reduce packaging?**

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# The Learning Unit on food packaging is in

https://docs.google.com/document/d/1NrKocko3weSpbs4cFmSy8pZvvexJjhqh/edit?usp=drive_link&ouid=117919987869015484455&rtpof=true&sd=true