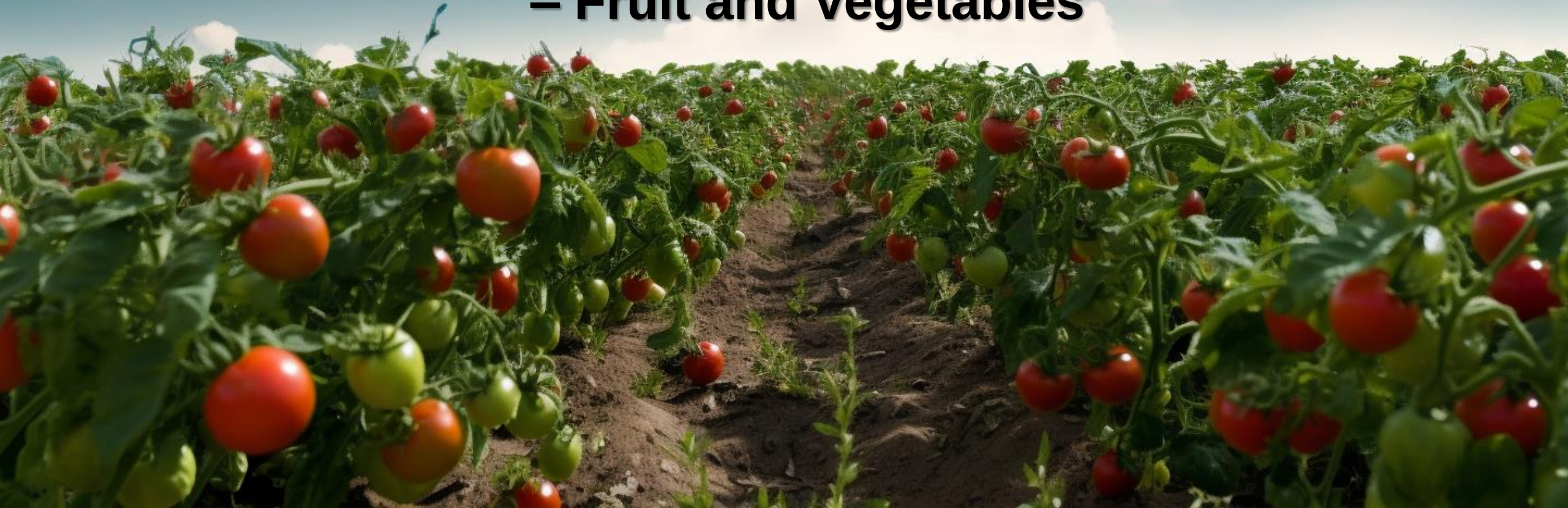


**Maximizing Agriculture to Enhance Nutrient Composition
to Better Fulfill Dietary Recommendations
– Fruit and Vegetables**



Fruit and vegetables and cancer risk: a review of southern European studies

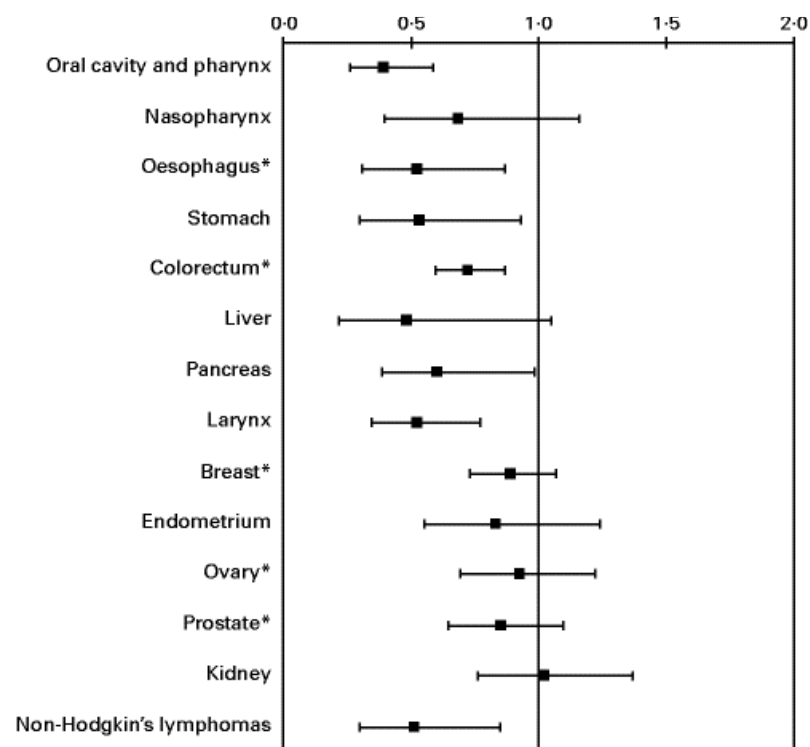
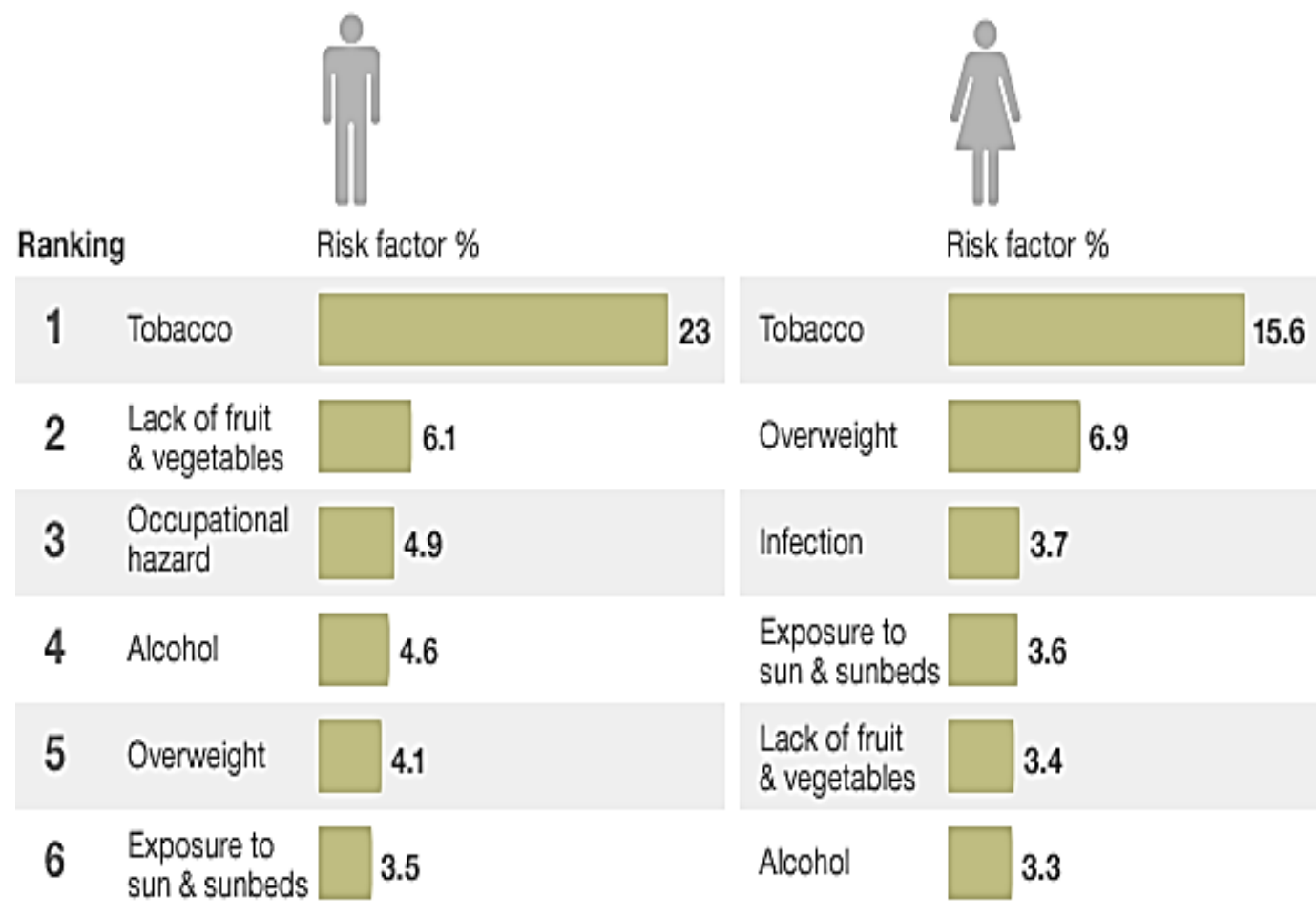


Fig. 2 Odds ratios and 95 % Confidence Intervals of selected cancers for the highest quintile v. the lowest quintile of fruit consumption for all cancer sites, except for nasopharyngeal and liver cancers, and non-Hodgkin's lymphomas (quartiles). Italy and Switzerland, 1991–2009. *Non-citrus fruits.

Turati et al., 2015 Fruit and vegetables and cancer, *Brit. J. Nutr.* 113, S102-S110 doi: 10.1017/S0007114515000148

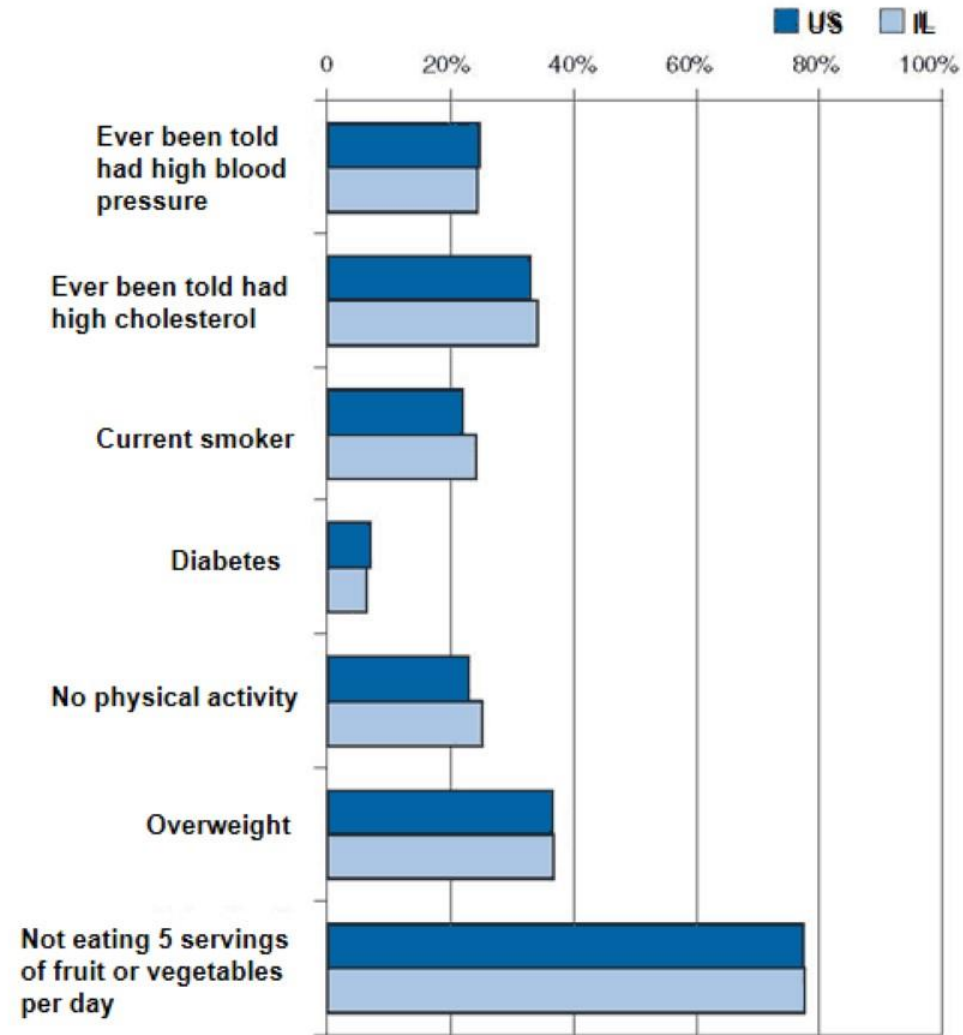
Top six causes of all cancers in men and women

Risk factors of the 158,700 cancers diagnosed in men and 155,600 cancers diagnosed in women each year



Source: Cancer Research UK

Risk Factors for Heart Disease and Stroke, 2003



Source: BRFSS, 2004

MINERALS

(per 100g)



ENERGY

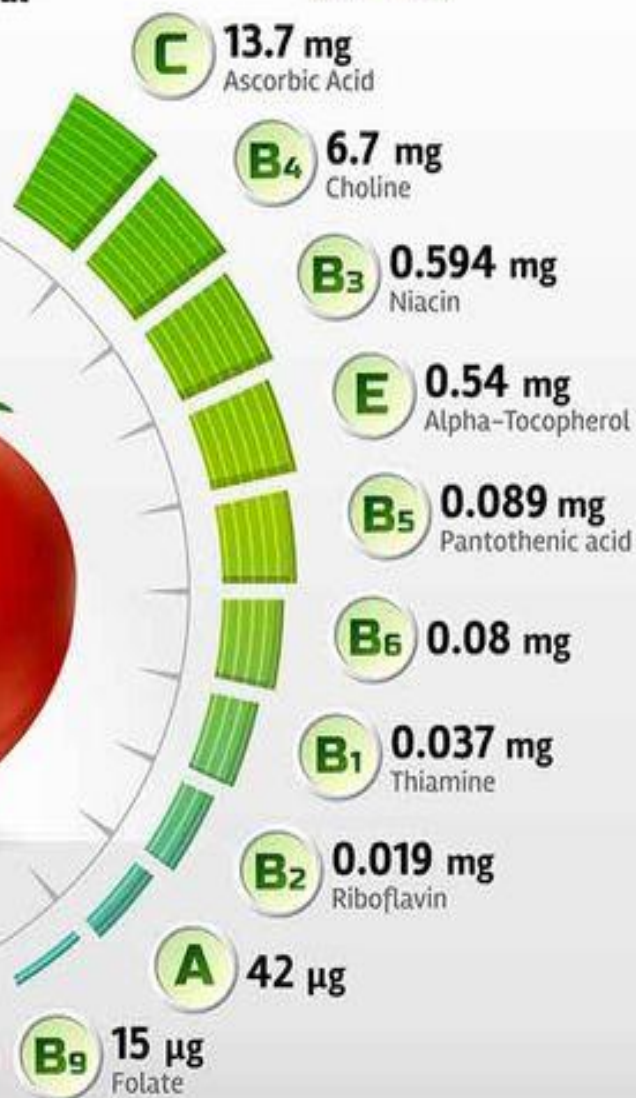
(per 100g)



18 kcal

VITAMINS

(per 100g)



CARBOHYDRATES

3.89 g

FAT

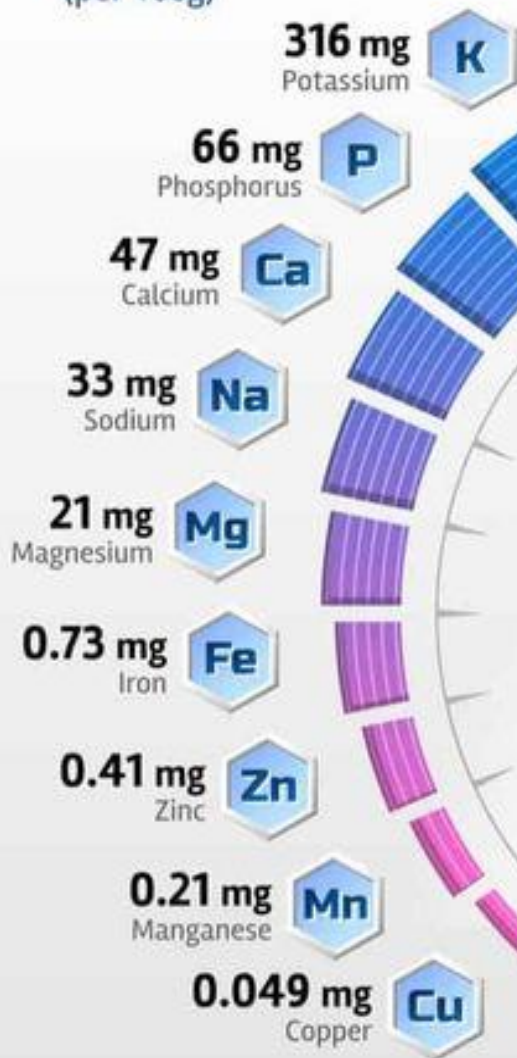
0.2 g

PROTEIN

0.88 g

MINERALS

(per 100g)



ENERGY

(per 100g)



34 kcal



VITAMINS

(per 100g)



CARBOHYDRATES

6.64 g

FAT

0.37 g

PROTEIN

2.82 g

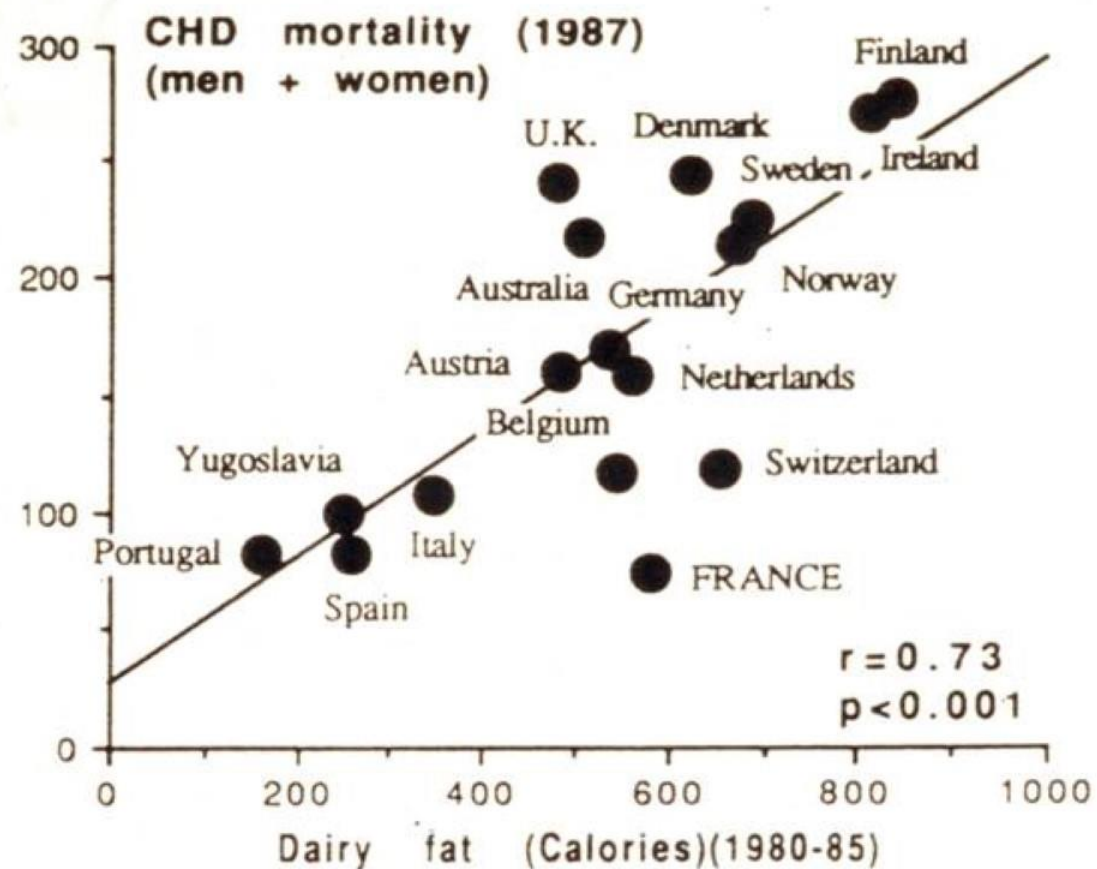
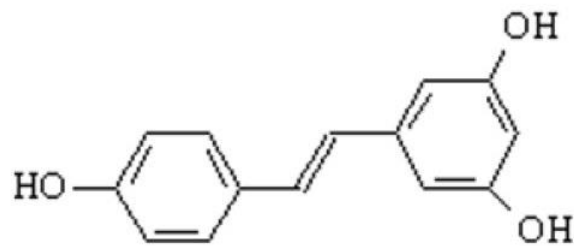


Fig 1—Relation between age-standardised death rate from CHD (mean for men and women)¹ and consumption of dairy fat in countries reporting wine consumption.

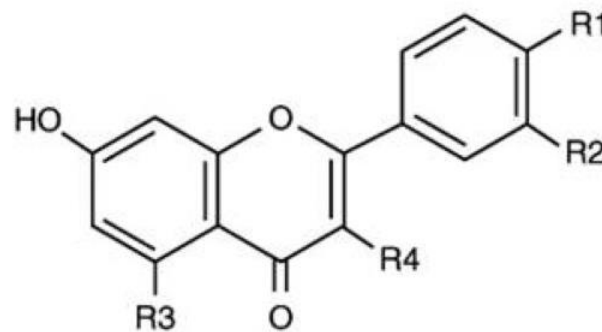
Regression equation: $y = 26.3 + 0.27 \text{ dairy fat}$.



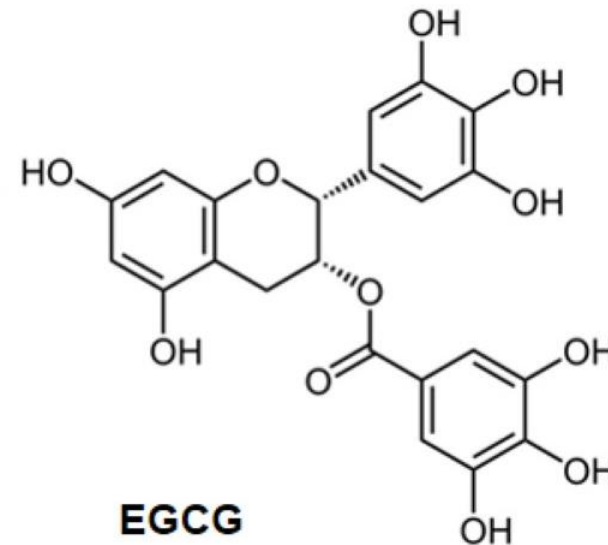
The foundations of the French Paradox



Resvératrol

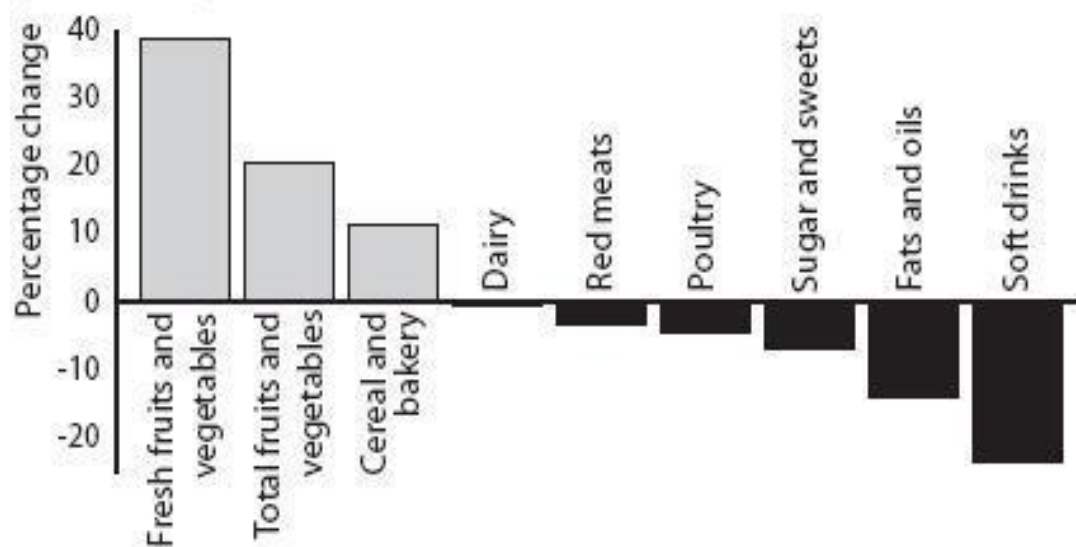


flavonol

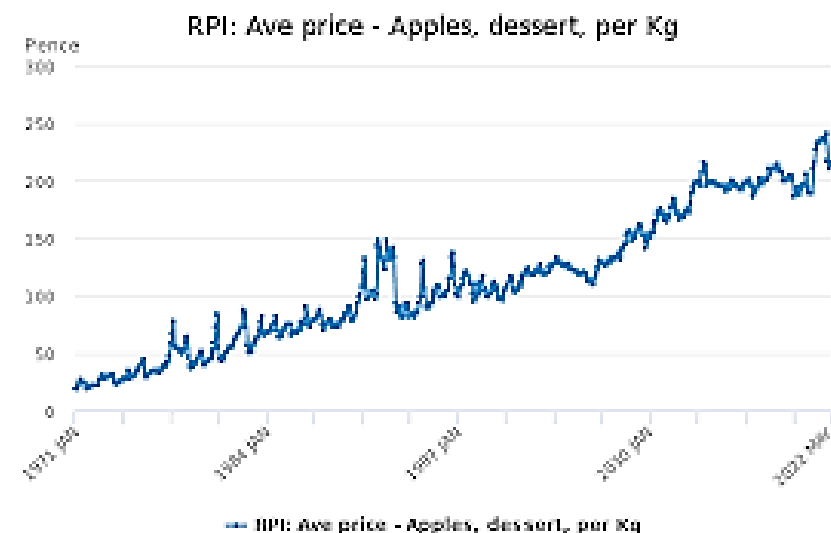


EGCG

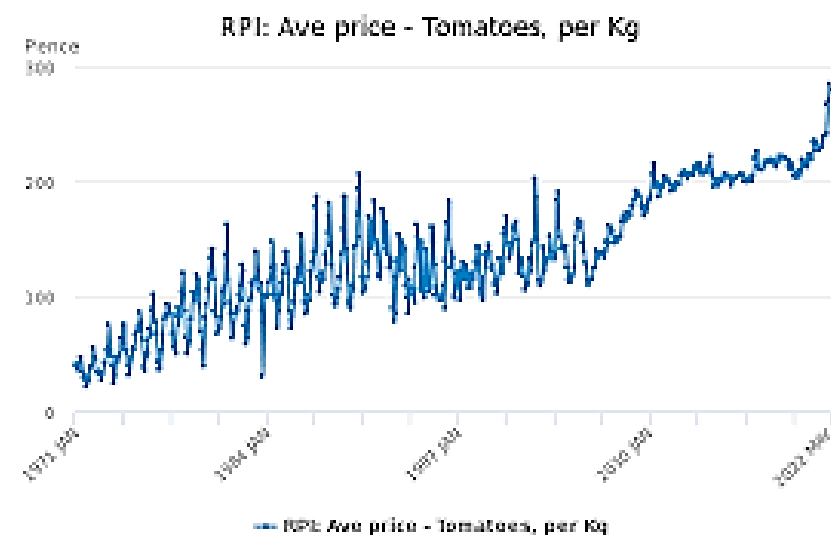
Change in food prices, 1985–2000
(real dollars)



Source: USDA ERS FoodReview, Vol. 25, Issue 3. Converted to real dollars.

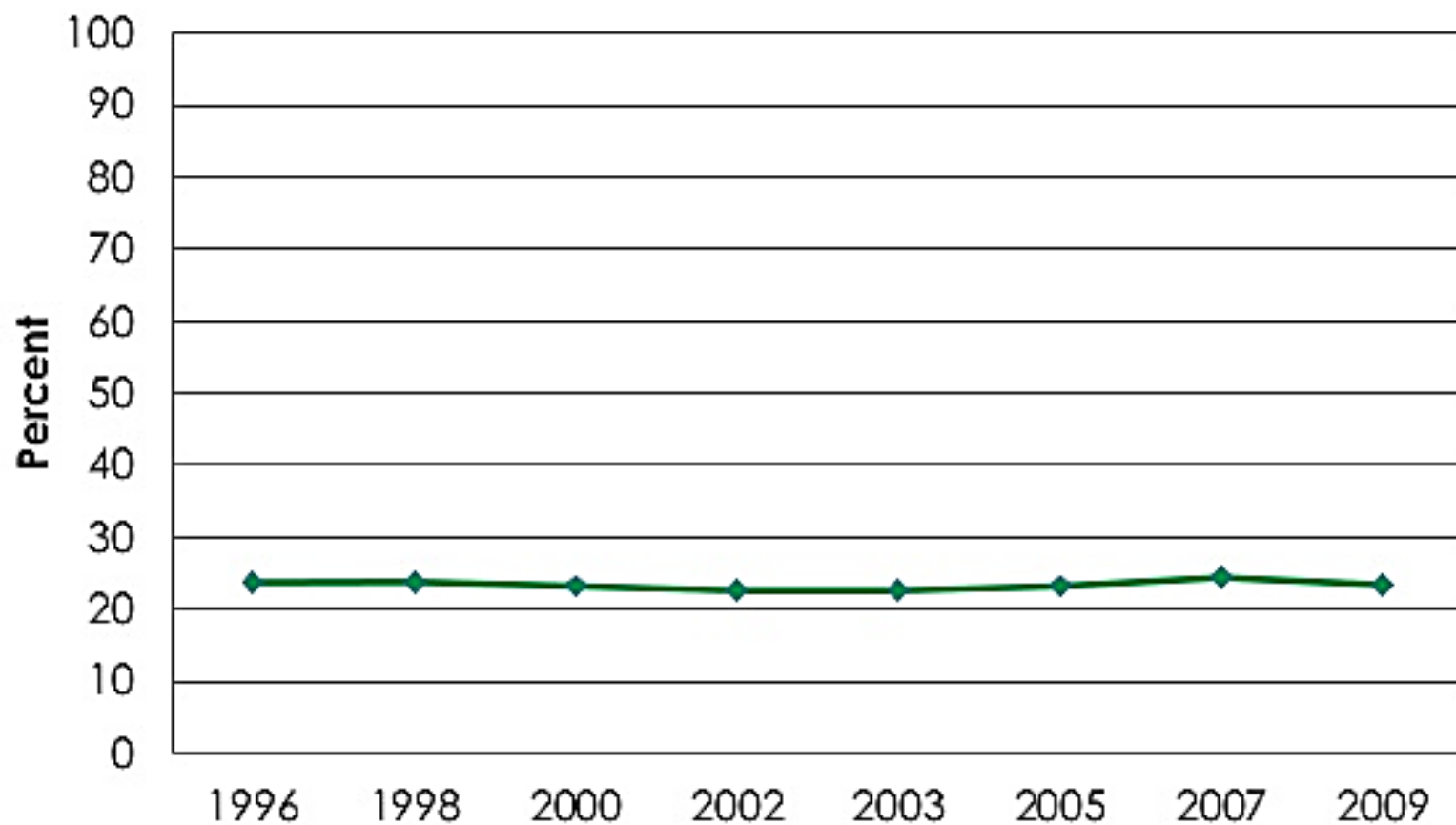


Source:



Source:

Percentage of U.S. Adults Consuming 5+ Fruits and Vegetables per Day

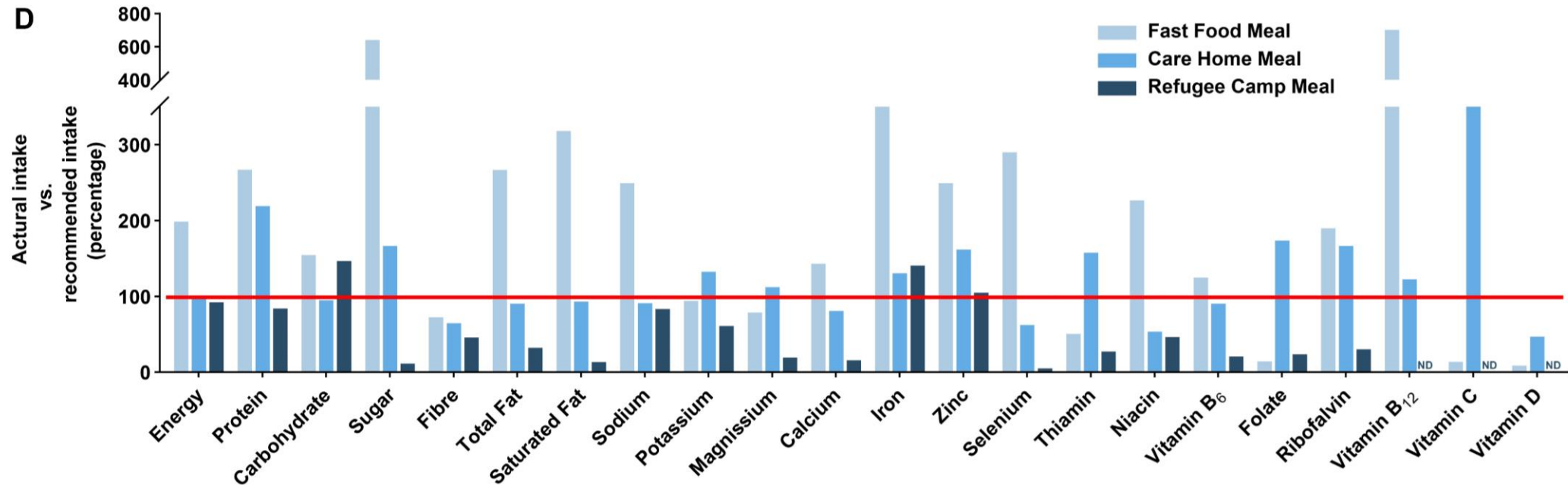


Source: CDC BRFSS

How can we get people to eat more fruit and vegetables?

- **Make fruit and vegetables relatively less expensive – subsidize horticulture?**
- **Make fruit and vegetables more accessible**
- **Public information campaigns**
- **Encourage fruit and vegetable consumption by children – school meals? school shops? lunch box offerings?**
- **Encourage fruit and vegetable consumption at work – fruit boxes?**
- **Ensure seniors eat fruit and vegetables – by ensuring nutritional standards in care and support services**
- **Implement the National Food Strategy in full – EAT-Lancet**
- **Make the fruit and vegetables that people do eat more nutritious – breeding and biotechnology?**

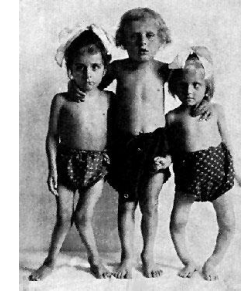
The relevance of biofortification



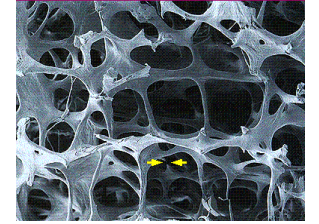
Vitamin D — absolutely critical to health

Maintains bone health and calcium homeostasis

Function as steroid hormone in many important organs and affect immune system



Rickets



Osteoporosis

Hair loss

Muscle pain

Depression

High blood pressure

Fatigue

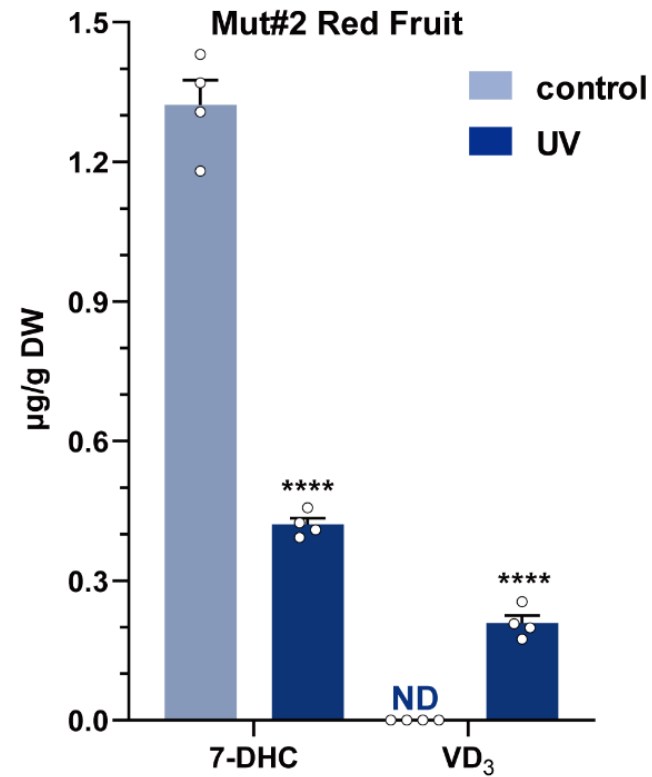
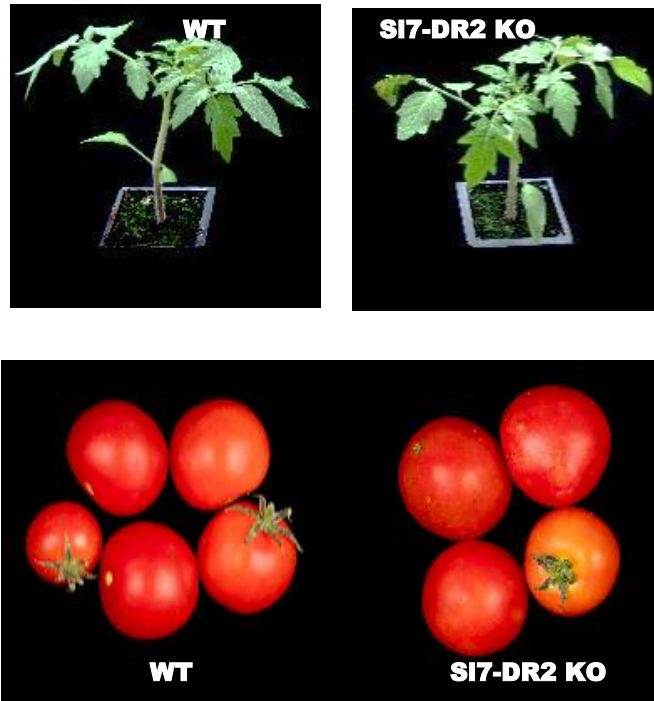
Joint pain

Short-term deficiency

Long-term deficiency

Vitamin D biofortification in plants

Treatment of fruit of *SI7-DR2* mutants with UV-B converts provitamin D₃ to vitamin D₃



= RNI

Norfo

n in 2007



Progress after 15 years:

On September 6th 2022 NPS received APHIS approval that the purple tomato could be deregulated as presenting no threat to the environment

On June 20th 2023 NPS received FDA notification – purple tomatoes are safe for human consumption



Norfolk Healthy Produce will sell tomato seed to home growers in the USA
See www.bigpurpletomato.com

Trialling and Breeding in Davis, California

