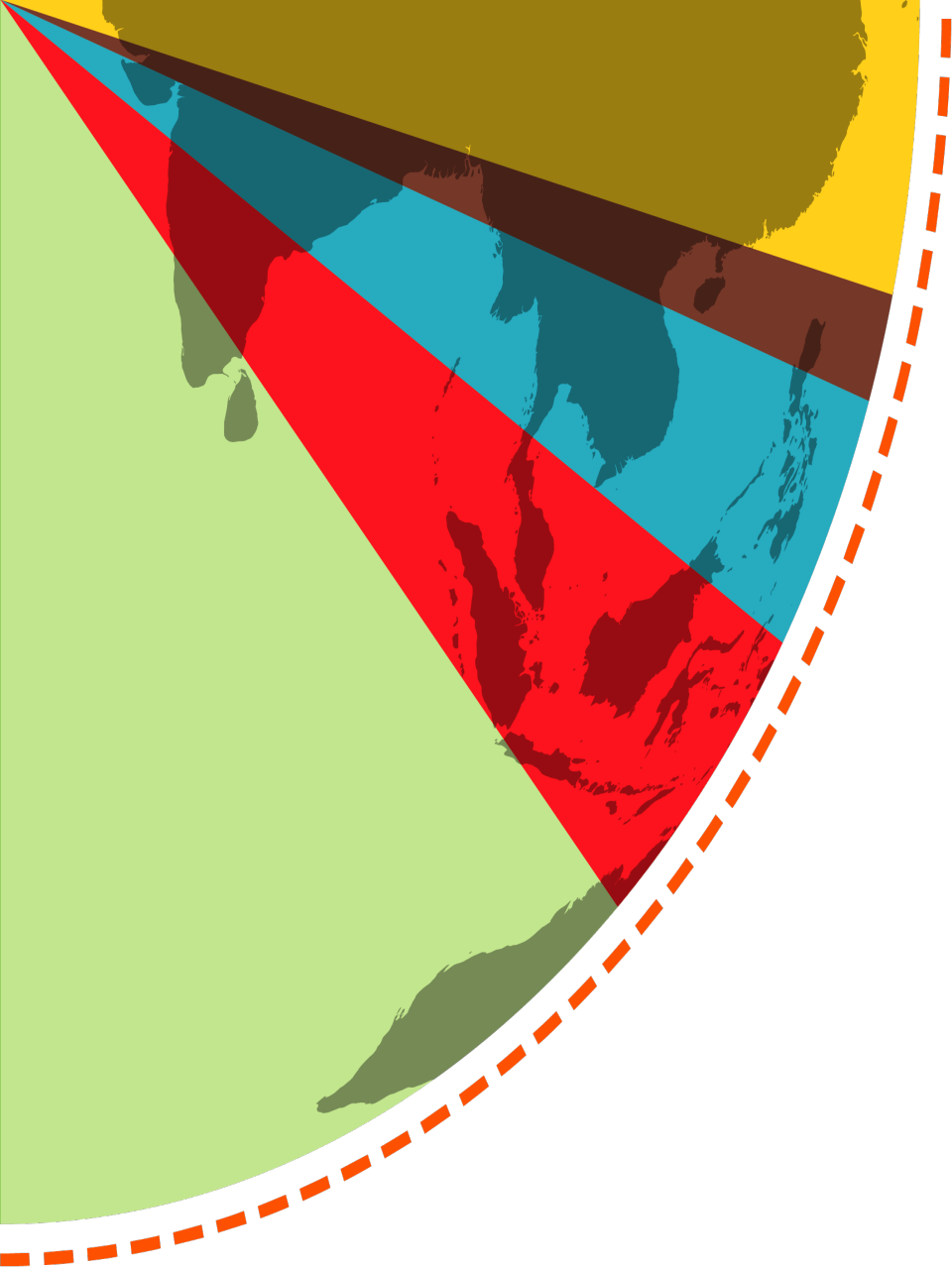# Food in the Anthropocene: The EAT Lancet Commission on healthy diets from sustainable food systems

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May 6, 2021

EAT

The EAT-*Lancet* Commission on Healthy Diets From Sustainable Food Systems

Food Planet Health

14.023

EAT/Lancet Commission

The Challenge: How to feed 9.8 billion people in 2050 a diet that is healthy and sustainable

The scale of the challenge

2 billion people lack key micronutrients like iron and vitamin A

155 million children are stunted

2 billion adults are overweight or obese

14.027a

Changes in Prevalence of Overweight/Obesity from 1980 to 2012

Overweight and obesity (BMI ≥25 kg/m²)

Legend:
- Developed, women
- Developed, men
- Developing, women
- Developing, men
- Global, women
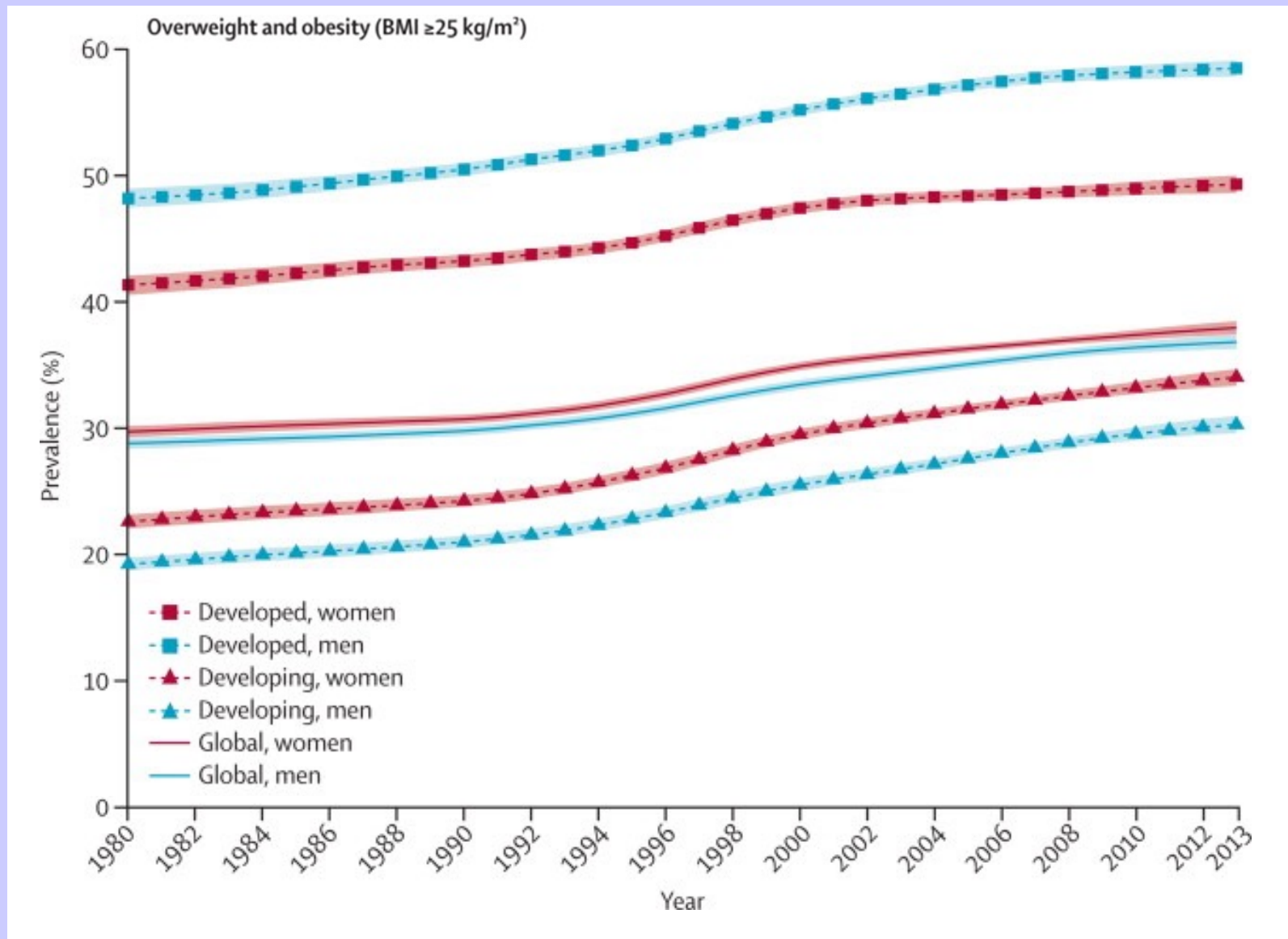- Global, men
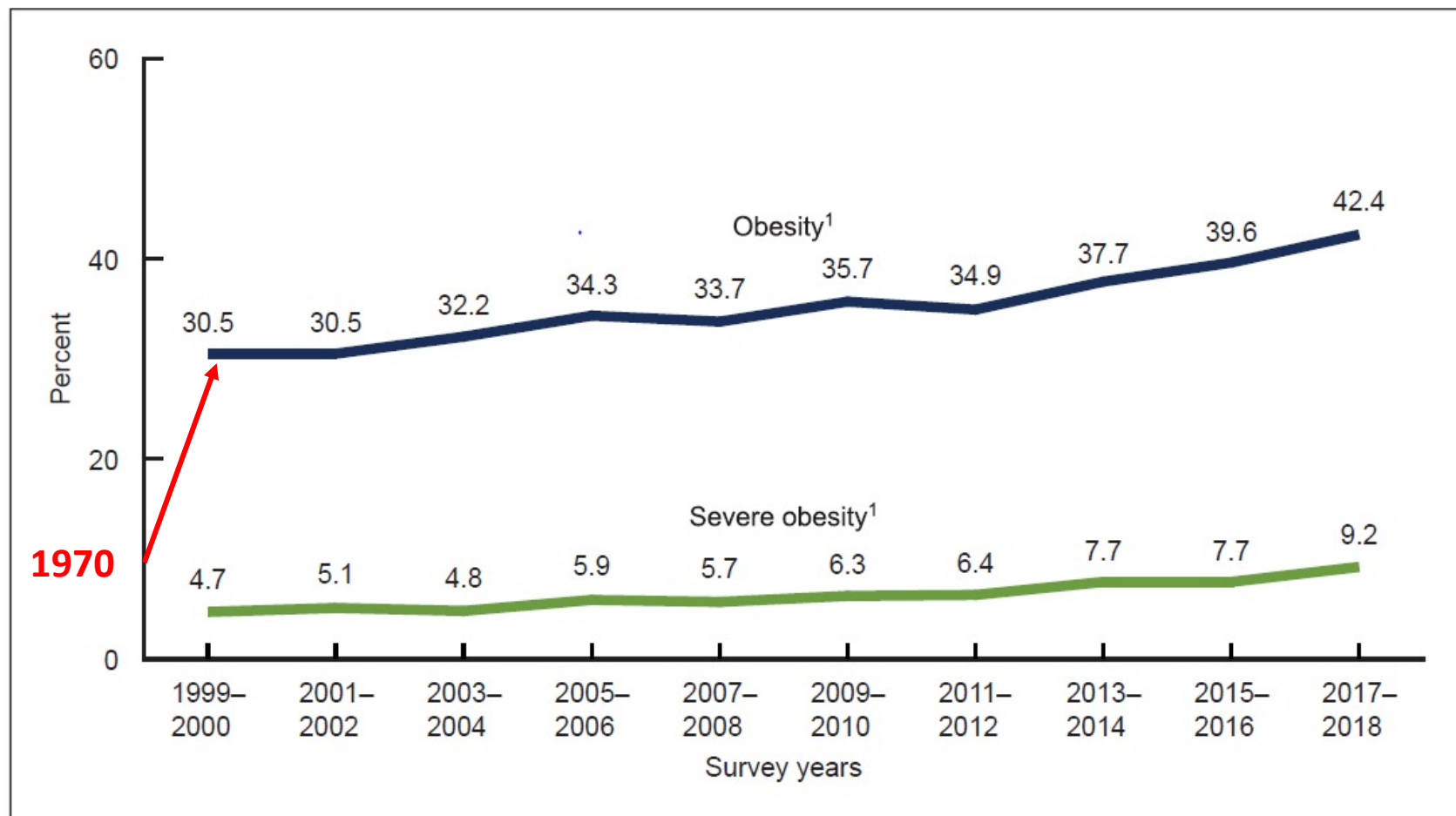
29.540

Ng, M,   Lancet, 2014

Figure 4. Trends in age-adjusted obesity and severe obesity prevalence among adults aged 20 and over: United States, 1999–2000 through 2017–2018

[1]Significant linear trend.
NOTES: Estimates were age adjusted by the direct method to the 2000 U.S. Census population using the age groups 20–39, 40–59, and 60 and over. Access data table for Figure 4 at: https://www.cdc.gov/nchs/data/databriefs/db360_tables-508.pdf#4.
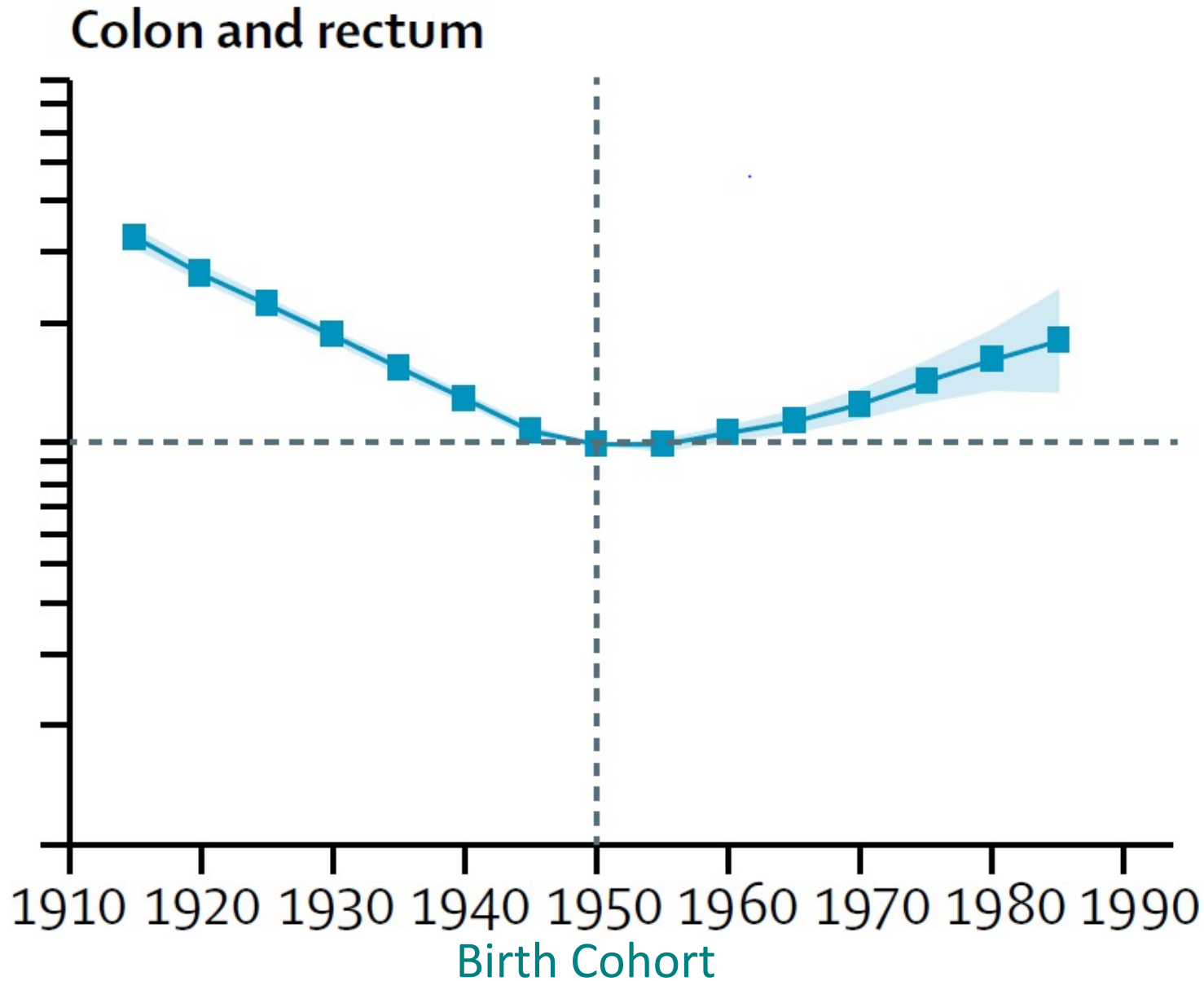SOURCE: NCHS, National Health and Nutrition Examination Survey, 1999–2018.

29.751b

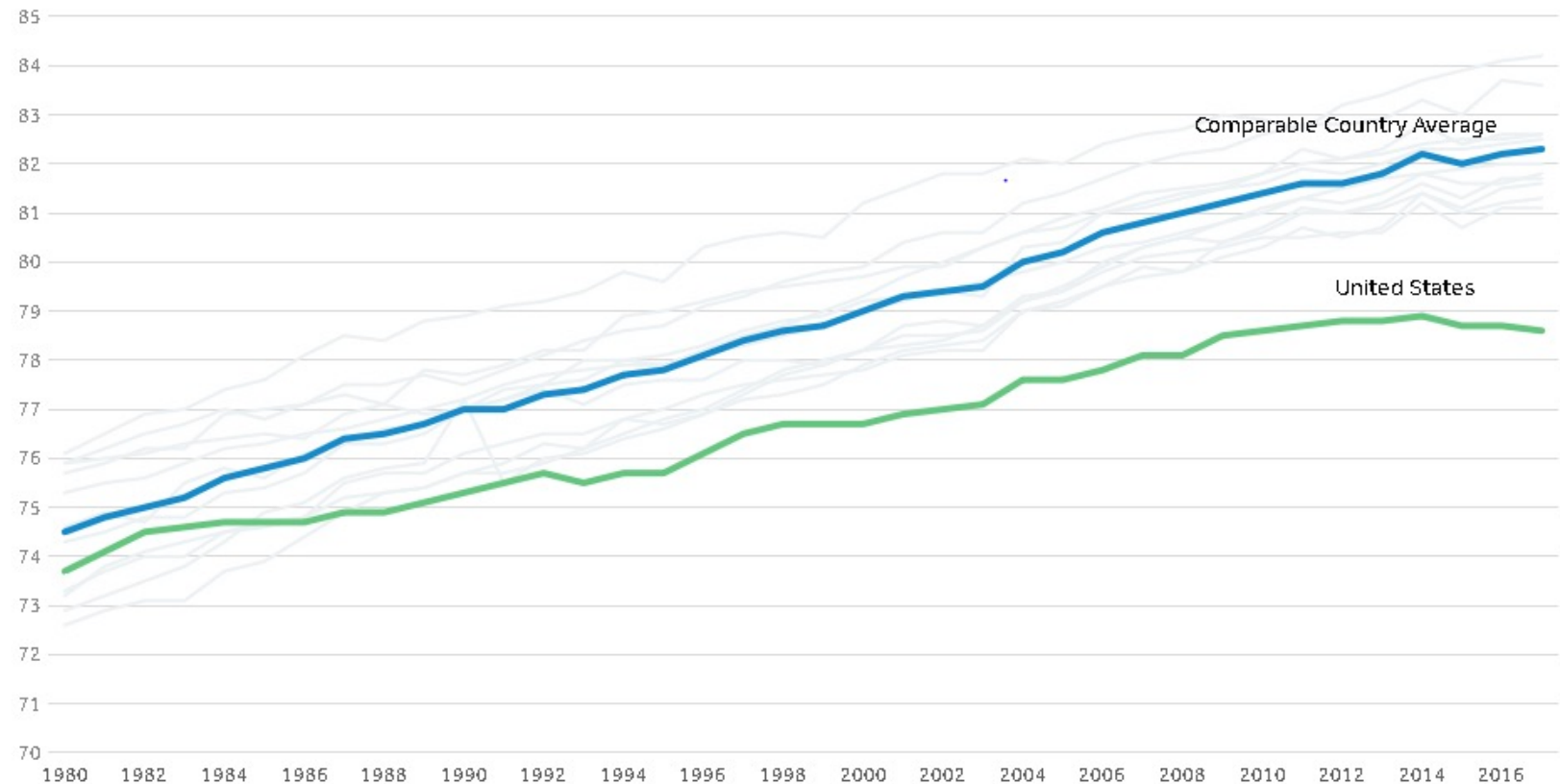# Death rates for cancer and heart disease among adults aged 45-64: United States, 1999-2017

9.306
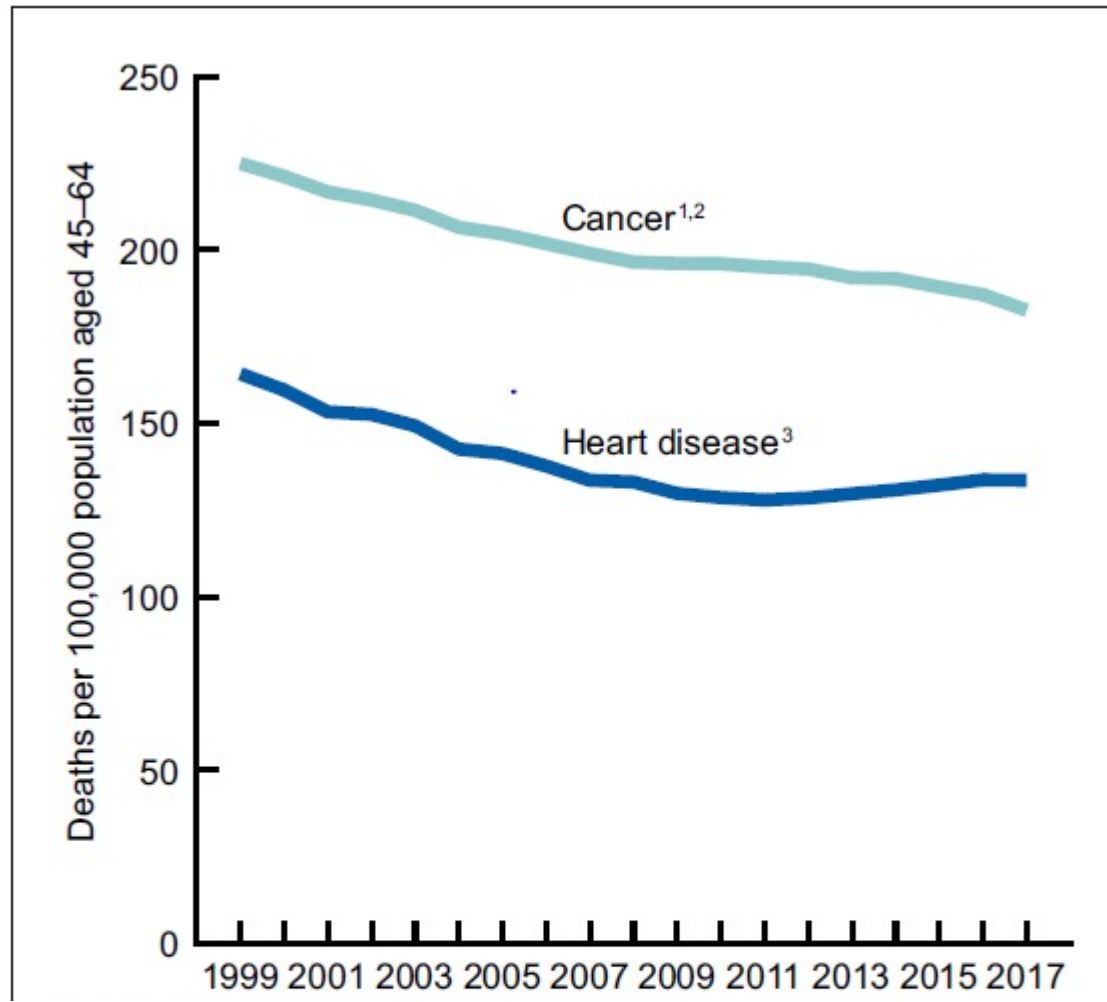
Trends in Obesity-Related Cancers by U.S. Birth Cohorts

Colon and rectum

Birth Cohort

2.159a

(Sung H et al., Lancet Public Health, 2019)

The U.S. has seen slower growth in life expectancy than comparable countries

Total life expectancy at birth in years, 1980-2017

Note: Break in series for Belgium and Switzerland in 2011, Germany in 1991, and Canada in 1982

(Rabab Kamal, Healthy System Tracker, 2019)

29.752

29.777

Geographical distribution of Alternate Healthy Eating Index in men and women aged 25 years or older in 190 countries/territories in 2017

Legend:
- under 34
- 34 - 38
- 38 - 42
- 42 - 46
- 46 - 50
- 50 - 54
- 54 - 58
- 58 - 62
- over 62
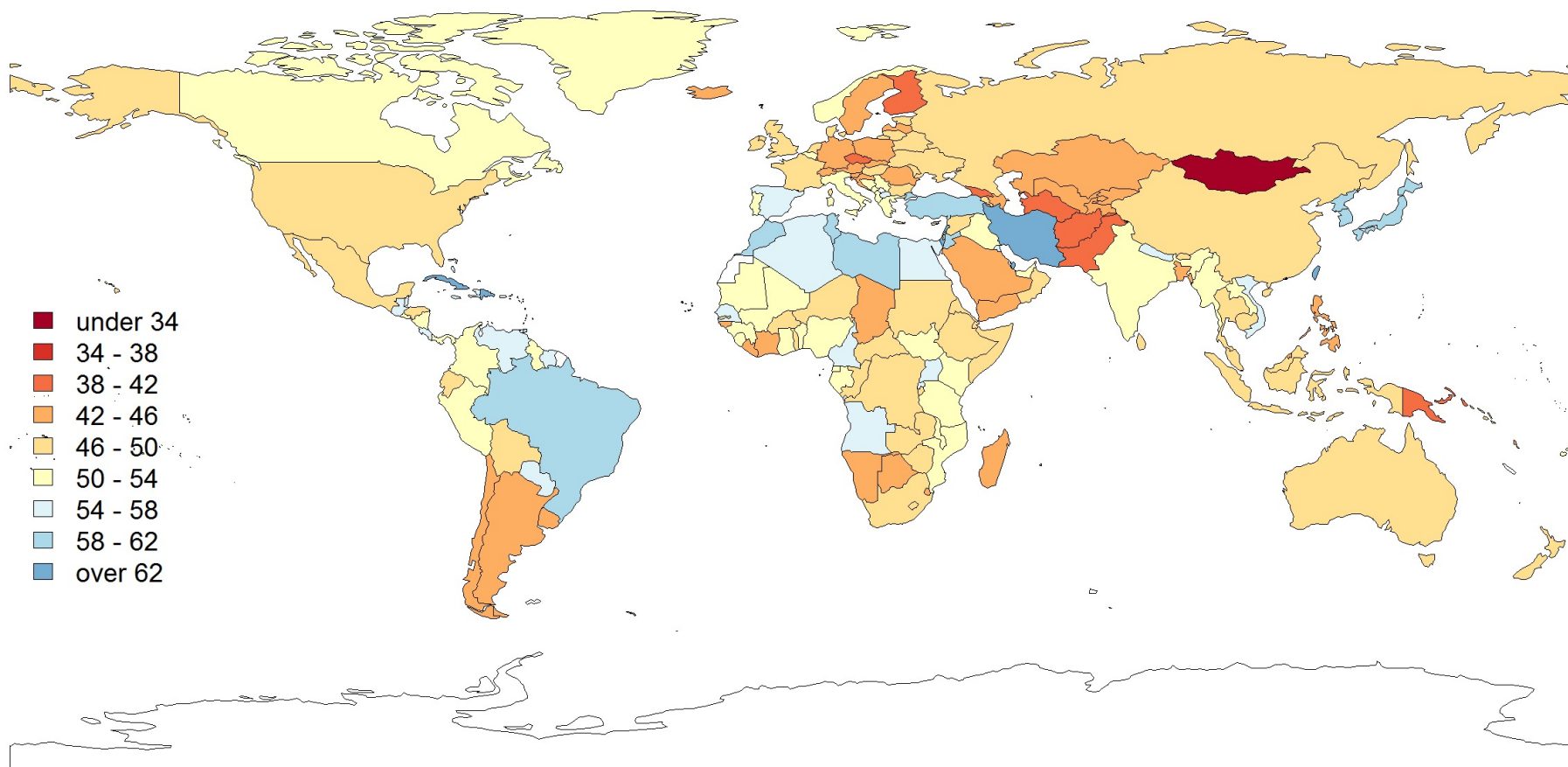
(D Wang, J Nutr 2019)

Turning up the heat

Temperatures in 2020 tied 2016's record levels. They were about 1°C above a 1951–80 average, or 1.25°C hotter than preindustrial levels.

40.031

Globe temperature increases

A Climate Change Vicious Circle

Permafrost melts
Arctic icecap shrinks
Air conditioning increases

40.027
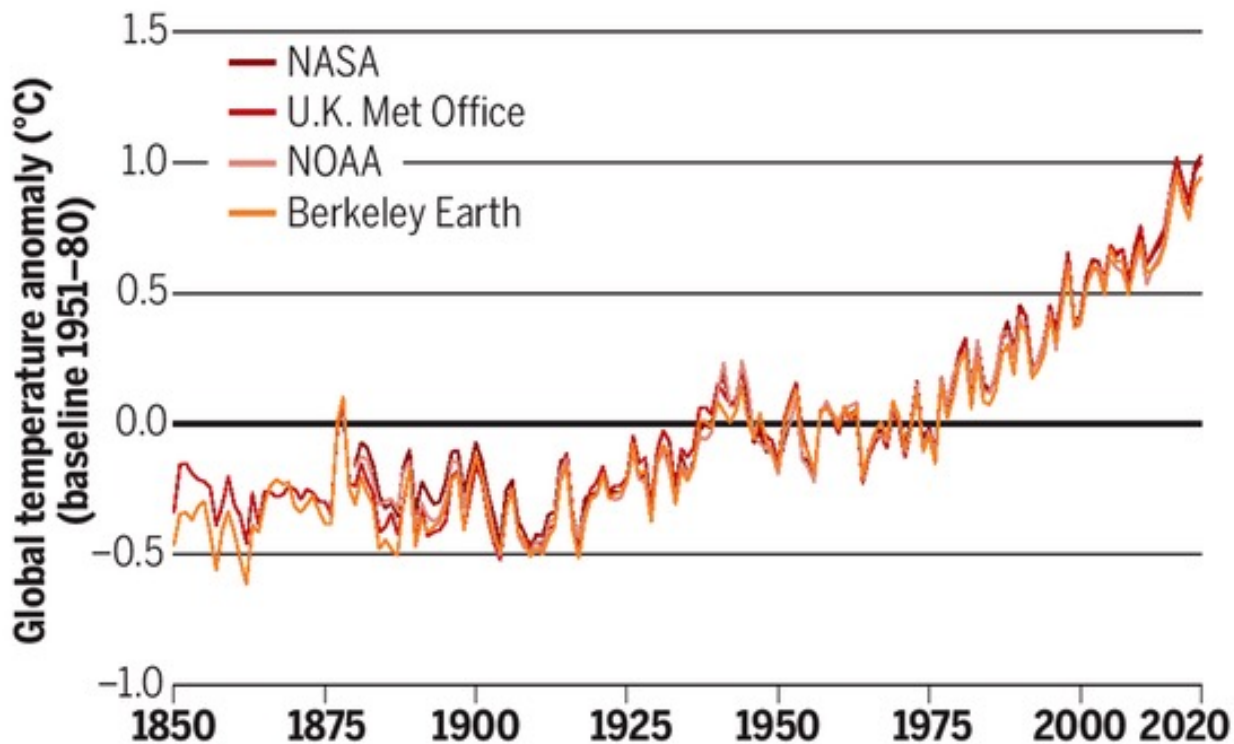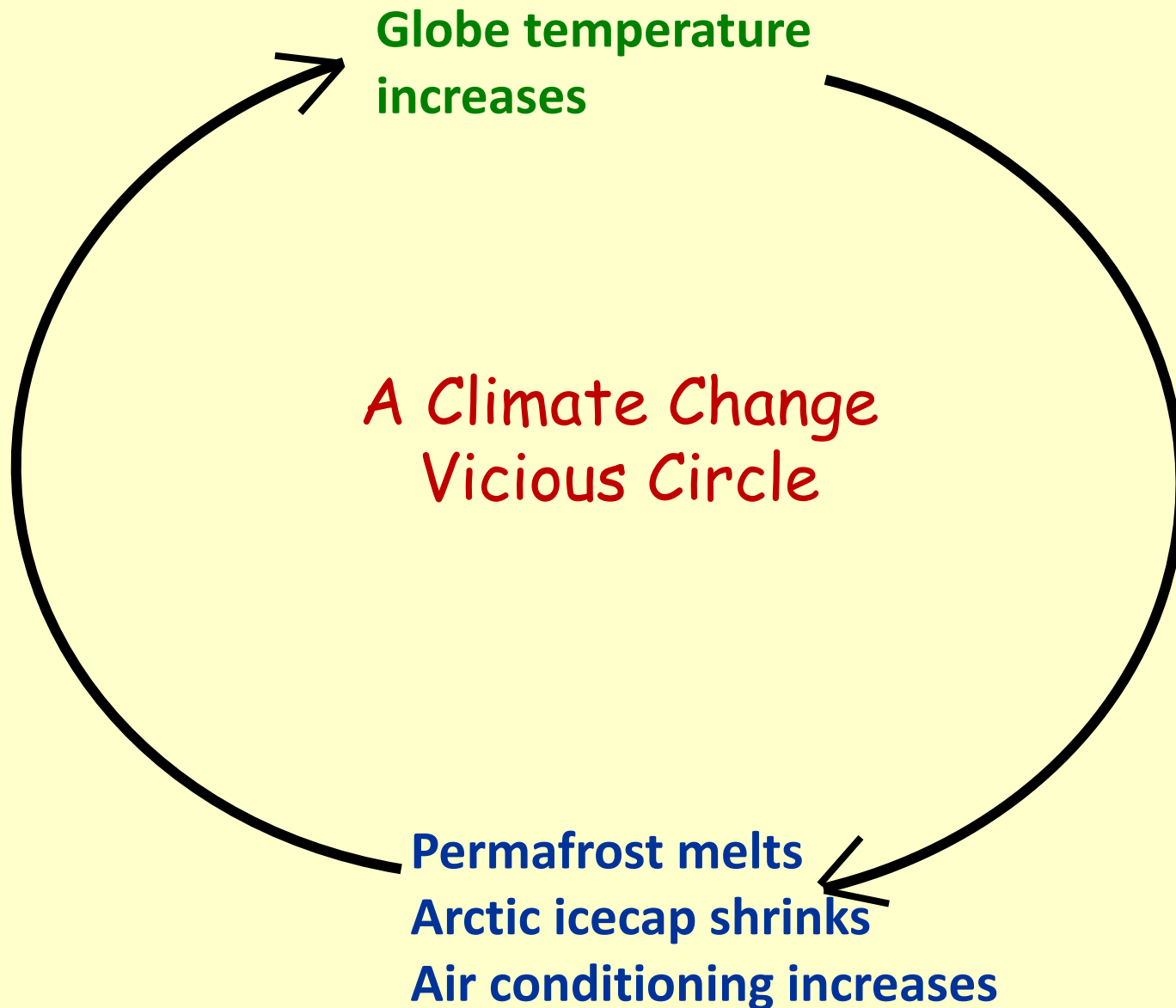
EAT-*Lancet* Commission Approach

Define a healthy reference diet using the best available evidence
(controlled feeding studies, long-term cohort studies, randomized trials).

Define planetary boundaries for 6 key environmental systems and processes (GHG, cropland use, water use, nitrogen and phosphorus application, extinction rate).

Apply a global food systems modeling framework to analyze what combinations of readily implementable measures are needed to stay within food production boundaries while still delivering healthy diets by 2050.

Outline Strategies to achieve the changes needed to meet the goal of healthy diets from sustainable food systems for all by 2050.

Ratio of Polyunsaturated Fat to Saturated Fat (P/S Ratio) for Major Protein Sources

14.076
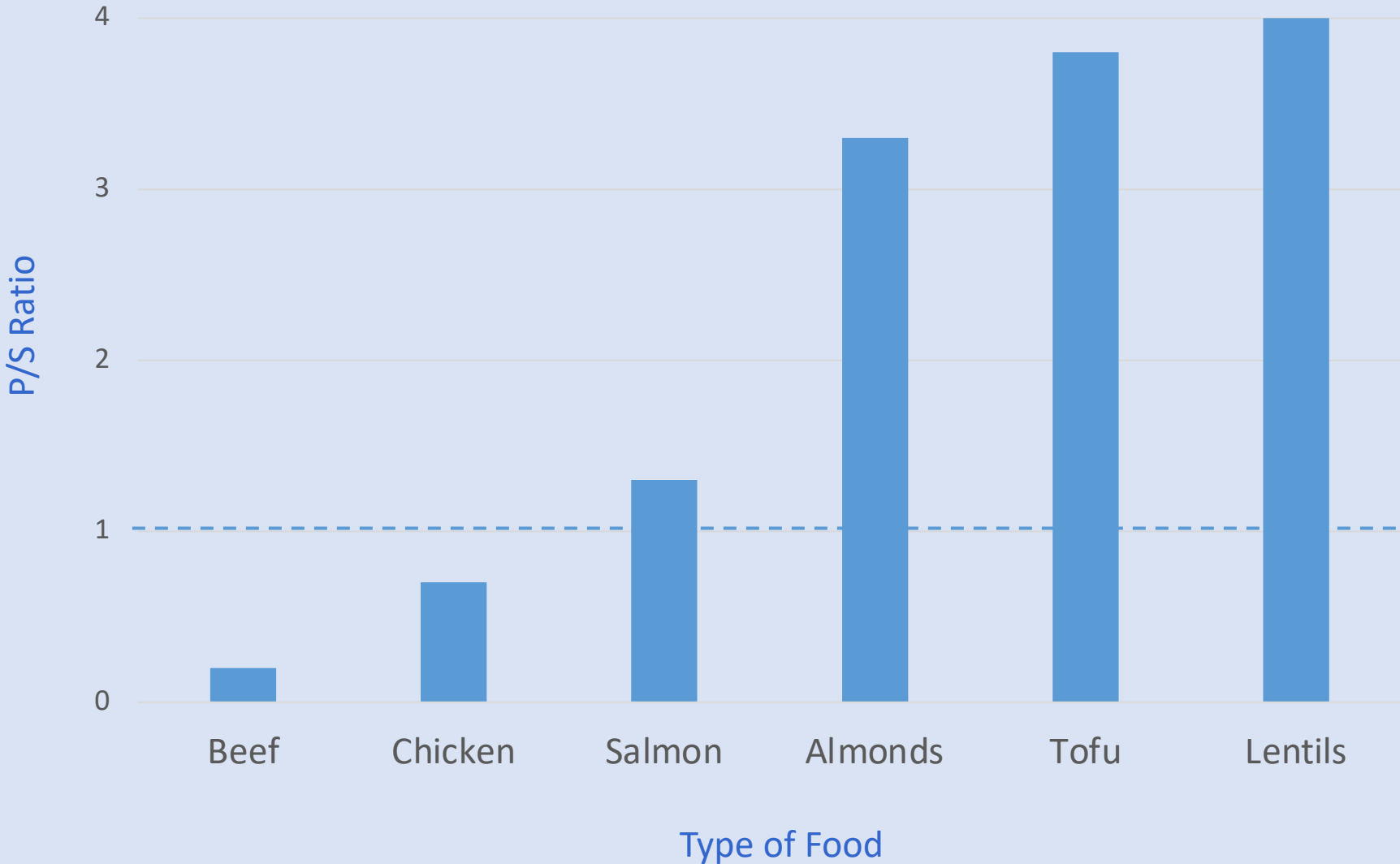
Meta-analysis assessing the effects of red meat on LDL cholesterol (mmol/L) from RCTs by type of comparison diet
(Guasch-Ferre M et al. Circulation 2019)

P=0.003

High-quality plant protein (e.g. legumes, soy, nuts)

Animal protein (fish, poultry, red meat, dairy)

Usual diet

14.067
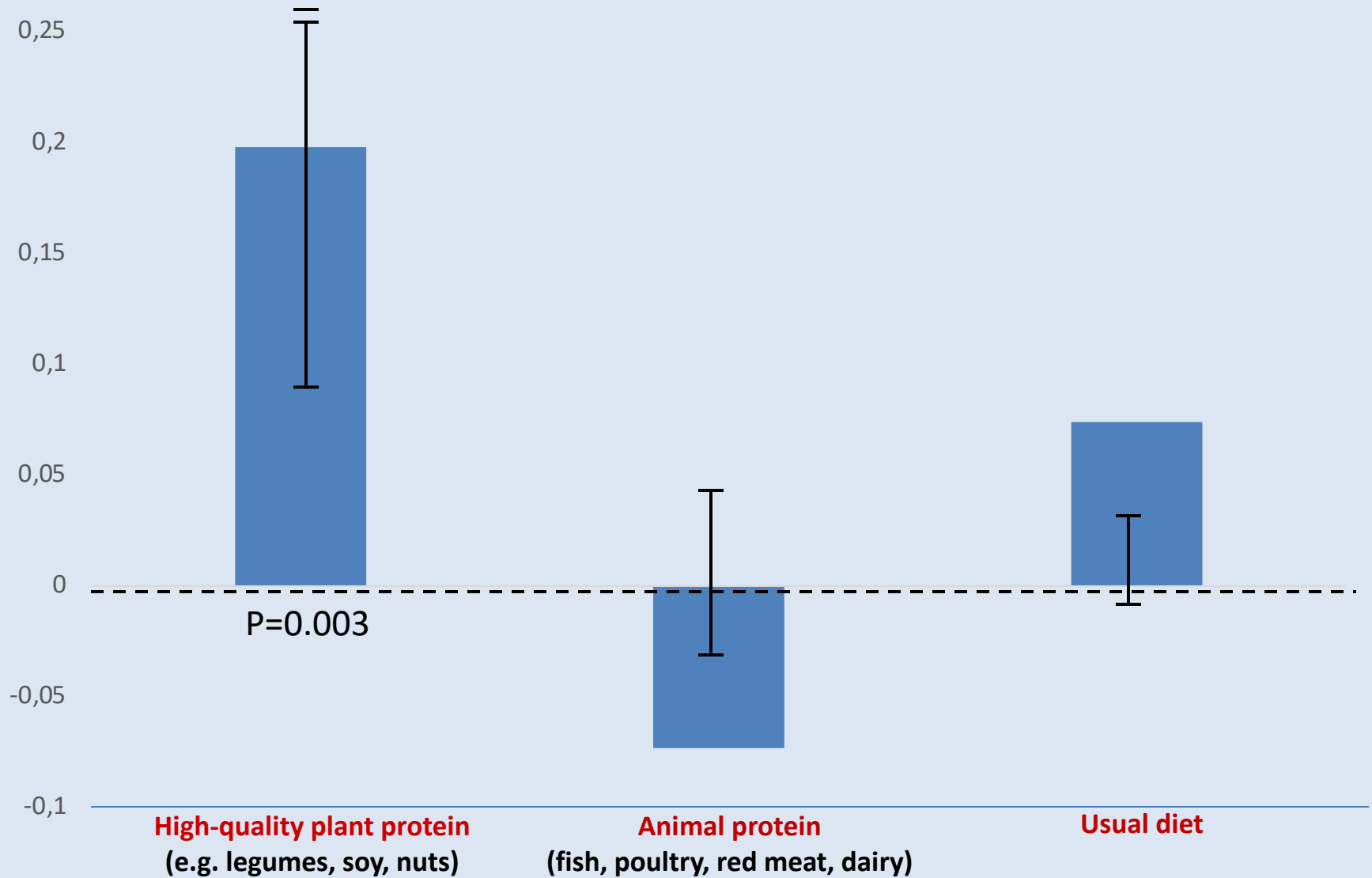
Network meta-analysis of 66 randomized trials of food group effects on risk factors for cardiometabolic disease
(LDL-C, TG, TC, HDL-C, FG, HbA1c, HOMA-IR, SBP, DBP, CRP)

Summary Ranking Score

14.080

(Schwingschakl L, Am J Clin Nutr 2017)
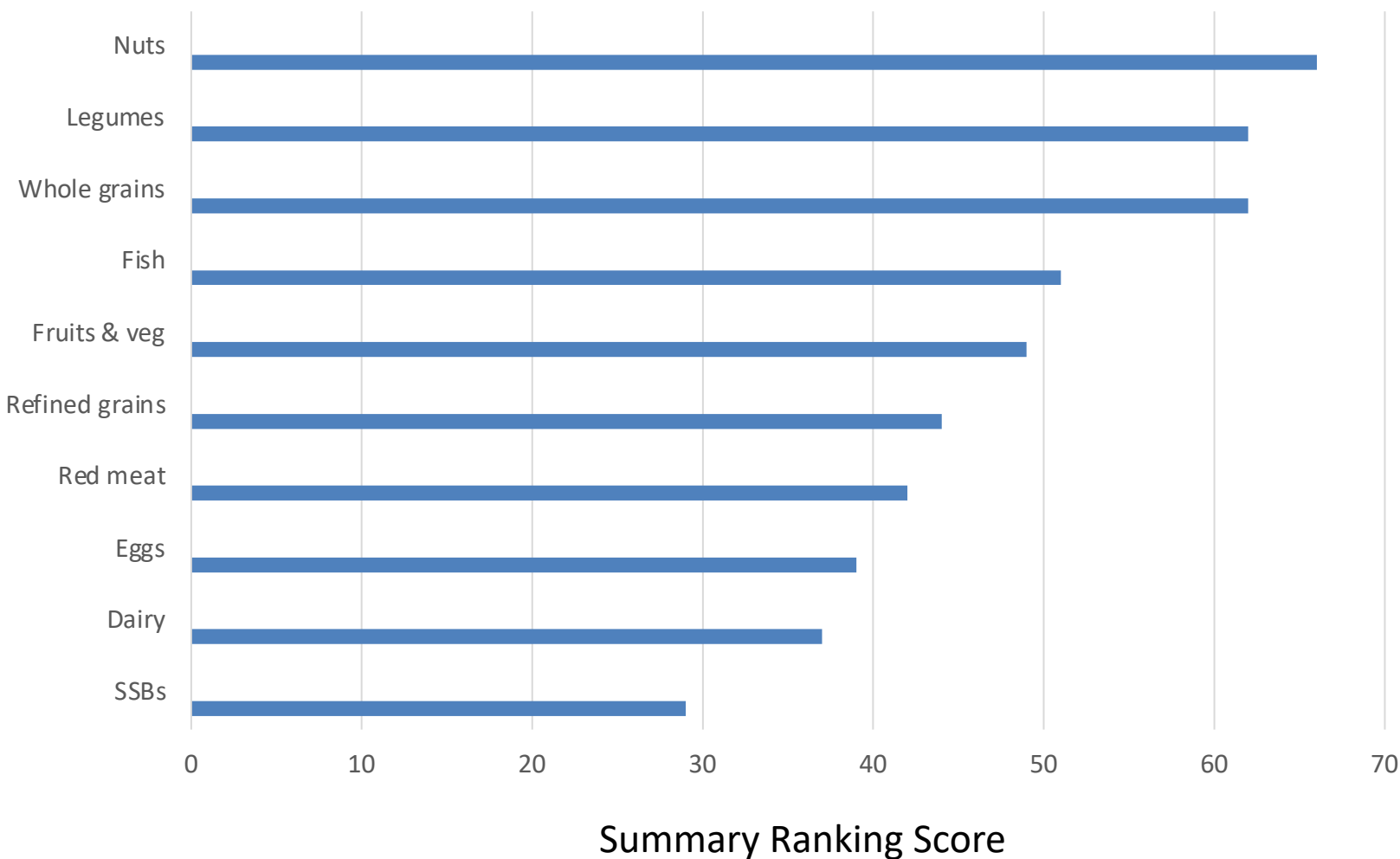
Nurses' Health Study (n=121,700)

1976 '78 '80 '82 '84 '86 '88 '90 '92 '94 '96 '98 2000 '02 '04 '06 '08 '10 '12 '14 '16

Diet Nails Diet Diet Diet/Blood Diet Diet Blood/Urine Diet Diet Diet

**OCS
Smoking
Weight/Ht
Med Hx**
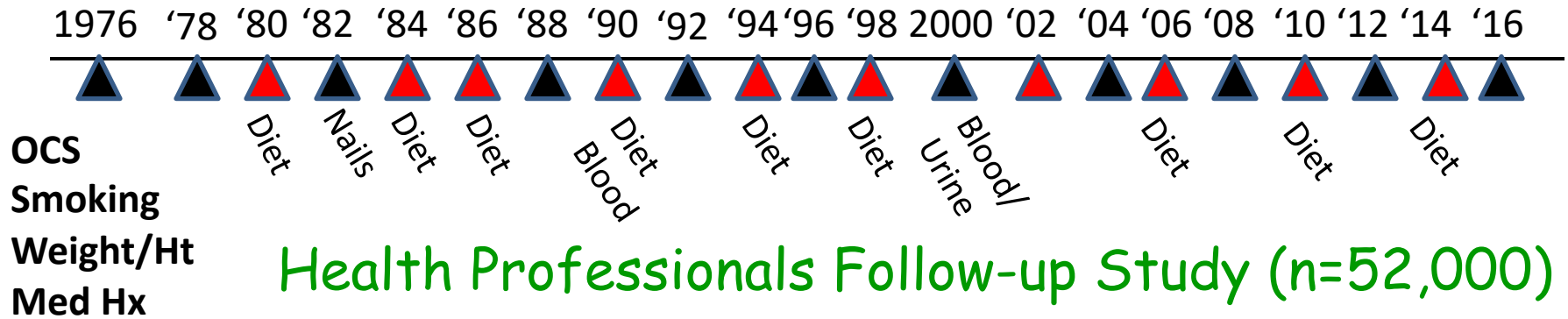
Health Professionals Follow-up Study (n=52,000)

1986 '88 '90 '92 '94 '96 '98 2000 '02 '04 '06 '08 '10 '12 '14 '16

Diet Nails Diet Diet/Blood Diet Diet Diet Diet Diet
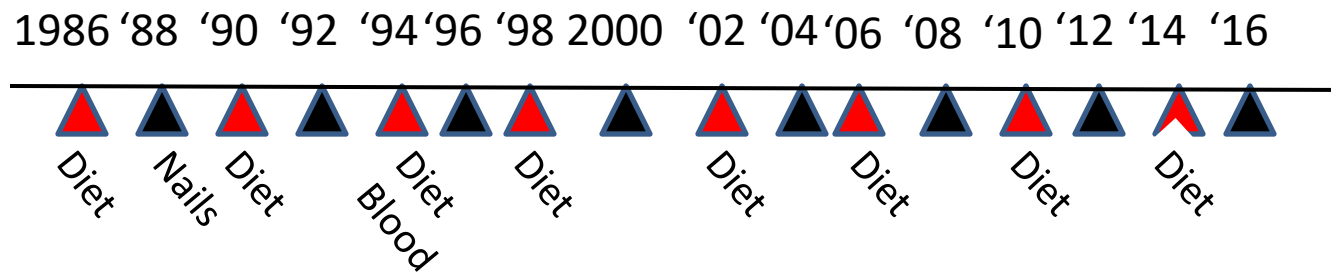
Nurses' Health Study II (n=116,000)

1989 '91 '93 '95 '97 '99 2001 '03 '05 '07 '09 '11 '13 '15

Diet Diet Blood Diet Diet Diet Urine Blood/Diet Diet
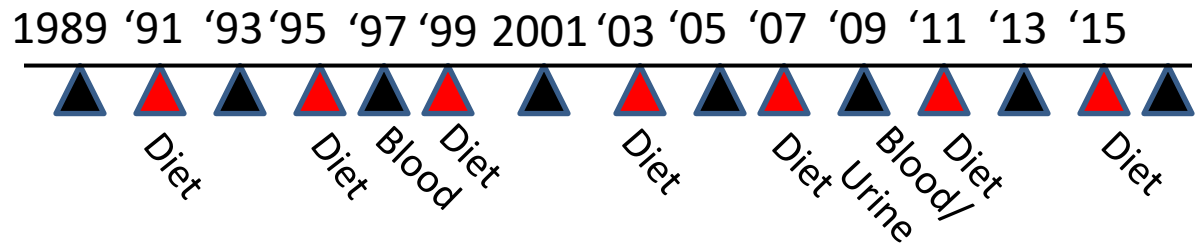
Investigators: Frank Speizer, Bernie Rosner, Meir Stampfer, Graham Colditz, David Hunter, JoAnn Manson, Eric Rimm, Edward Giovannucci, Alberto Ascherio, Gary Curhan, Charles Fuchs, Michelle Holmes, Donna Spiegelman, Frank Hu, Heather Eliassen, Lorelei Mucci, Jae Hee Kang, Andy Chan, Qi Sun, +

0.386

Differences in all-cause mortality for major protein sources vs dairy (for 3% of energy from protein)
(recalculated from Song M et al. JAMA Intern Med 2016)

29.724
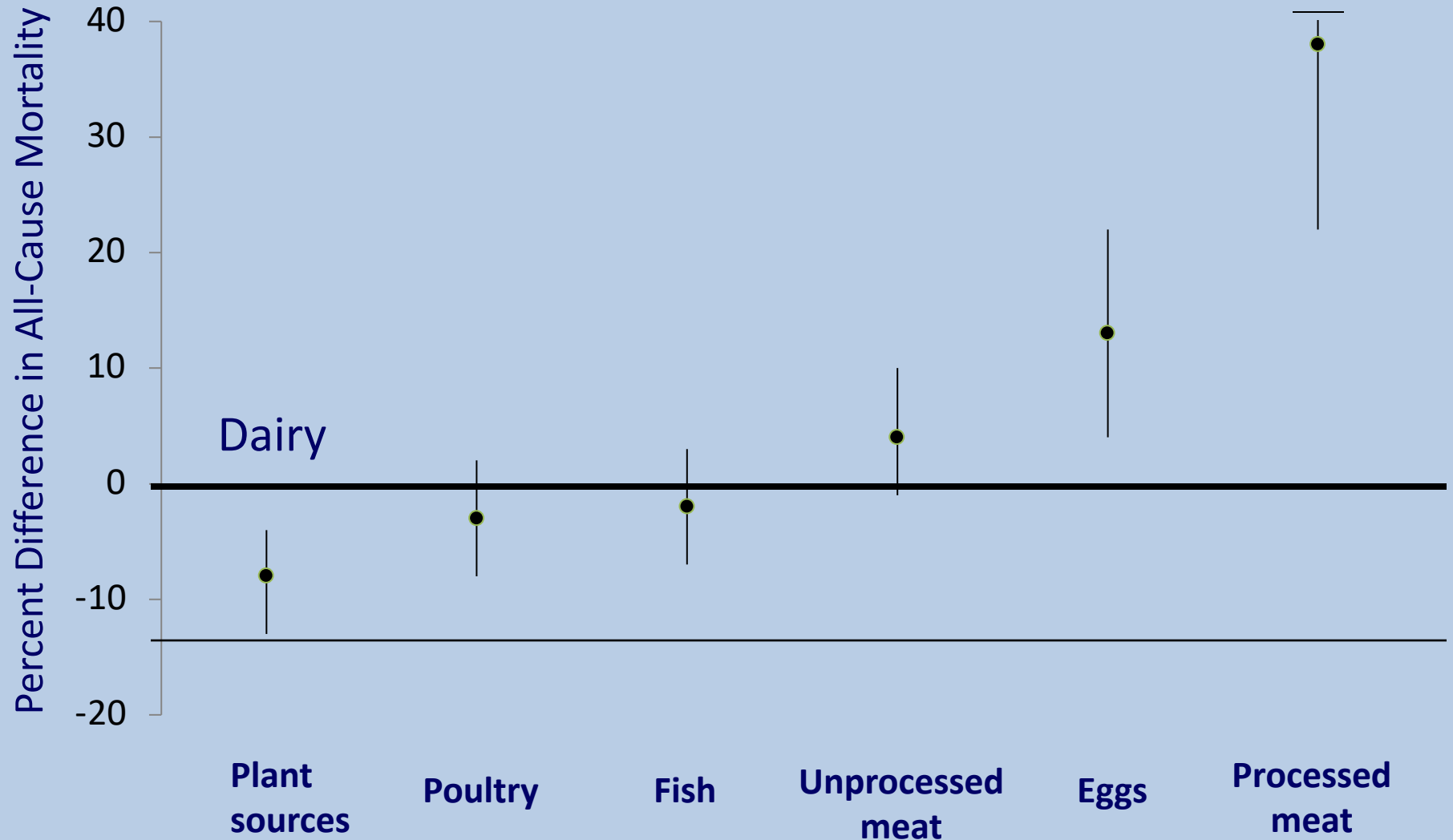
Types of Fat and Total Mortality

▶ MV-adjusted results, isocaloric comparison is CHO

(Wang D et al. JAMA Intern Med 2016)

9.290
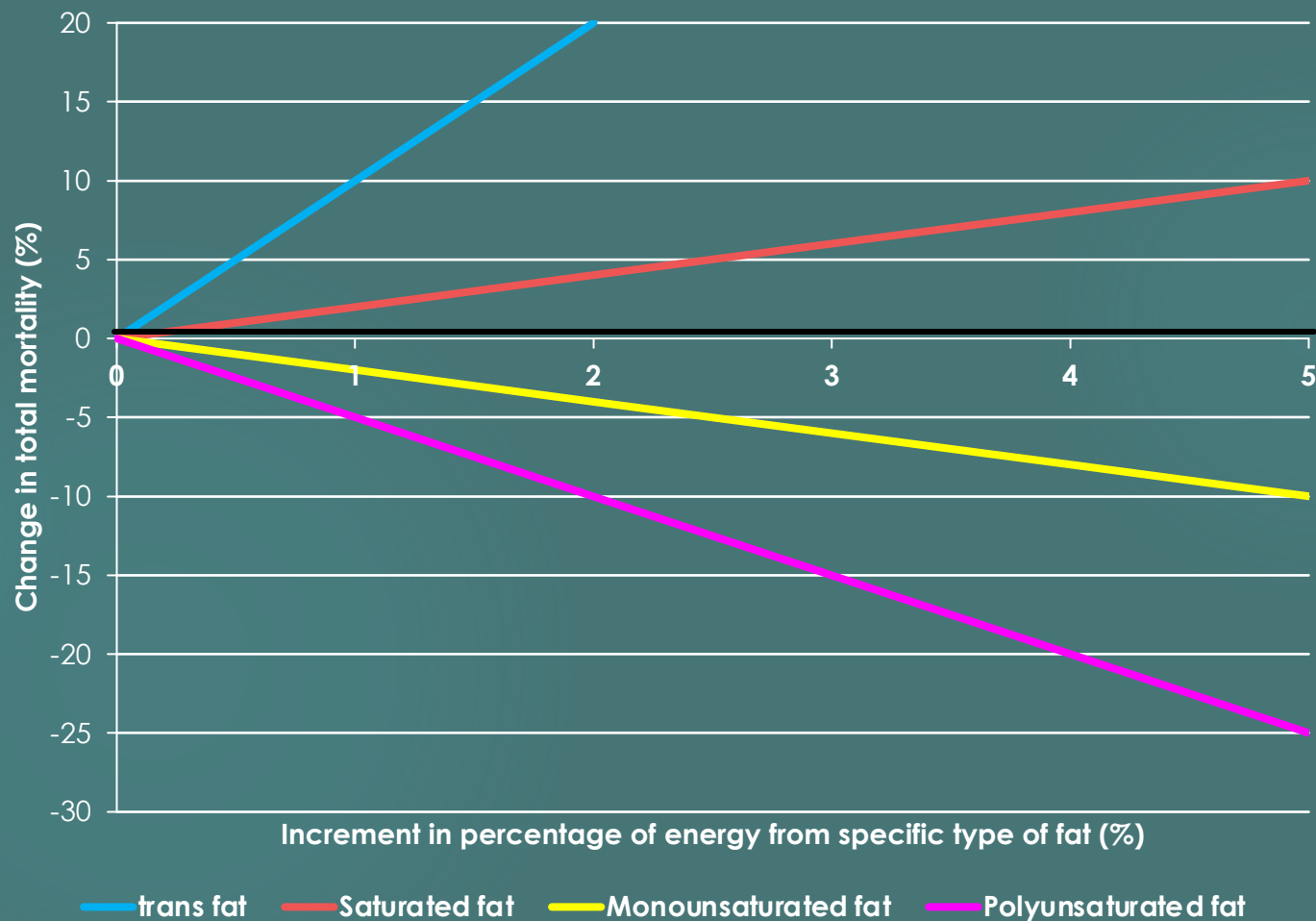
Red Meat and Total Mortality in the NHS and HPFS

(Pan A et al., Arch Intern Med 2012)
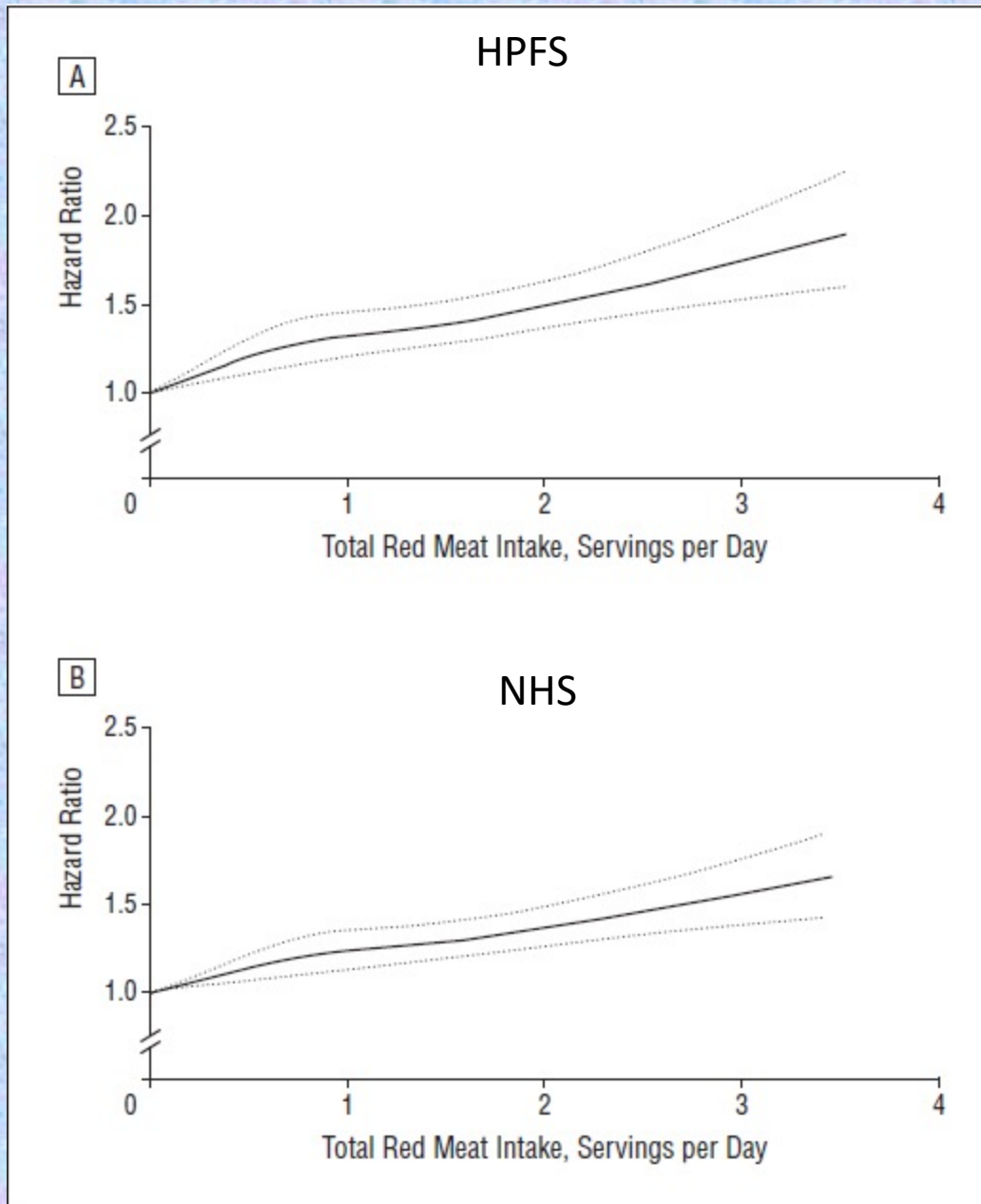
Relation of red meat to risk of Type 2 diabetes in NHS, NHSII, and HPFS
(204,156 men and women, 13,759 incident cases)

Relative Risk (95% CI) (y-axis, 0 to 1.6)

Target

RR for 1 svg/day = 1.14 (1.10, 1.18), P-trend <0.001

Q1 (svgs=0.4) Q2 (svgs=0.7) Q3 (svgs=1.0) Q4 (svgs=1.3) Q5 (svgs=2.0)

Quintiles of red meat intake, servings/day
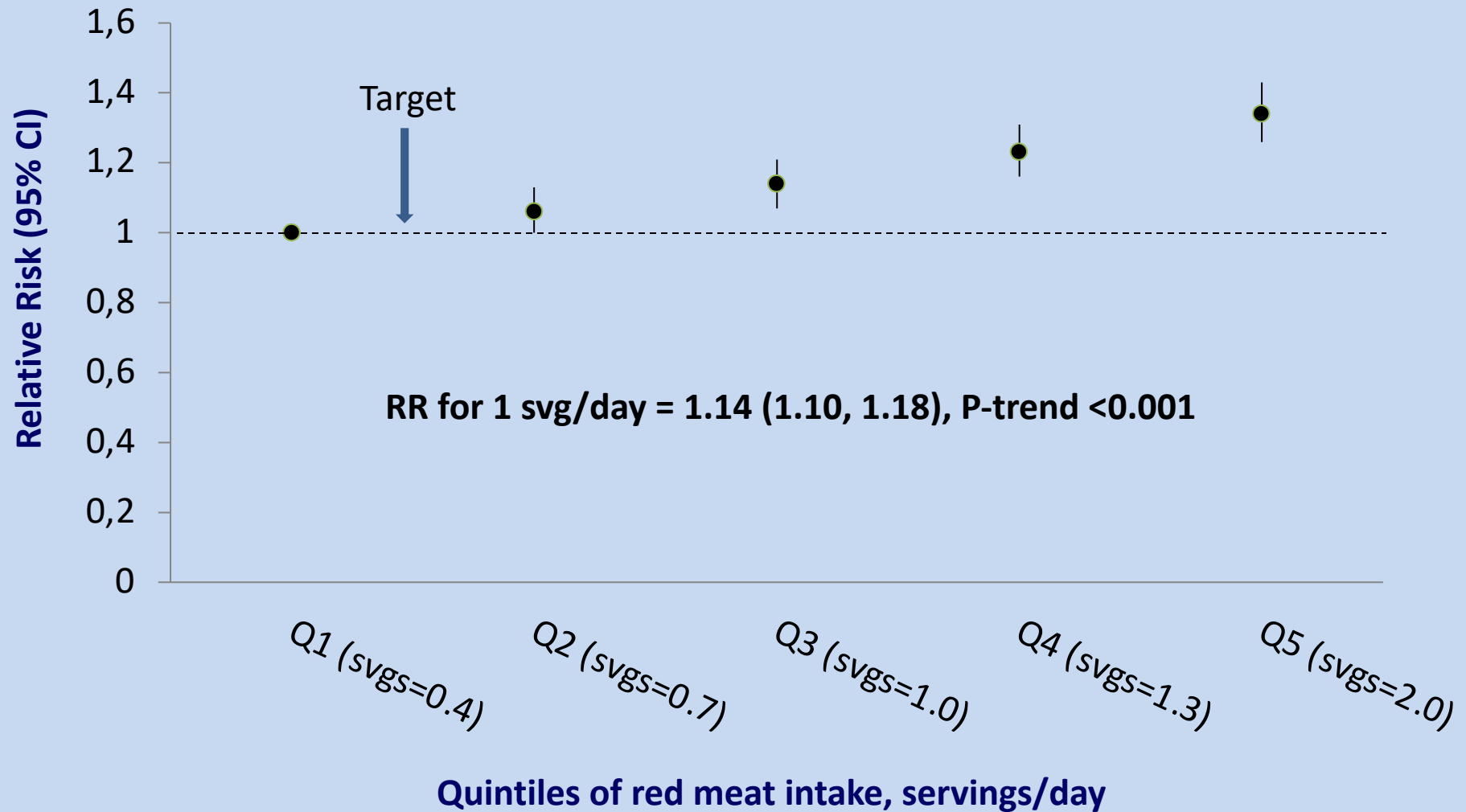
*Servings are average for 3 cohorts, considering 85 g/svg (3%)
**N.B. Intake of red meat in "optimal diet" = 19 g/day (Micha R et al. PLoS One 2017)

14.058

(Pan A et al. AJCN 2011)

Kaplan-Meier Estimates of the Incidence of Outcome Events in the Total Predimed Study Population

(Estruch R et al. NEJM 2013)

9.246

Scientific Targets for Healthy Diets
(2500 Kcal/day)

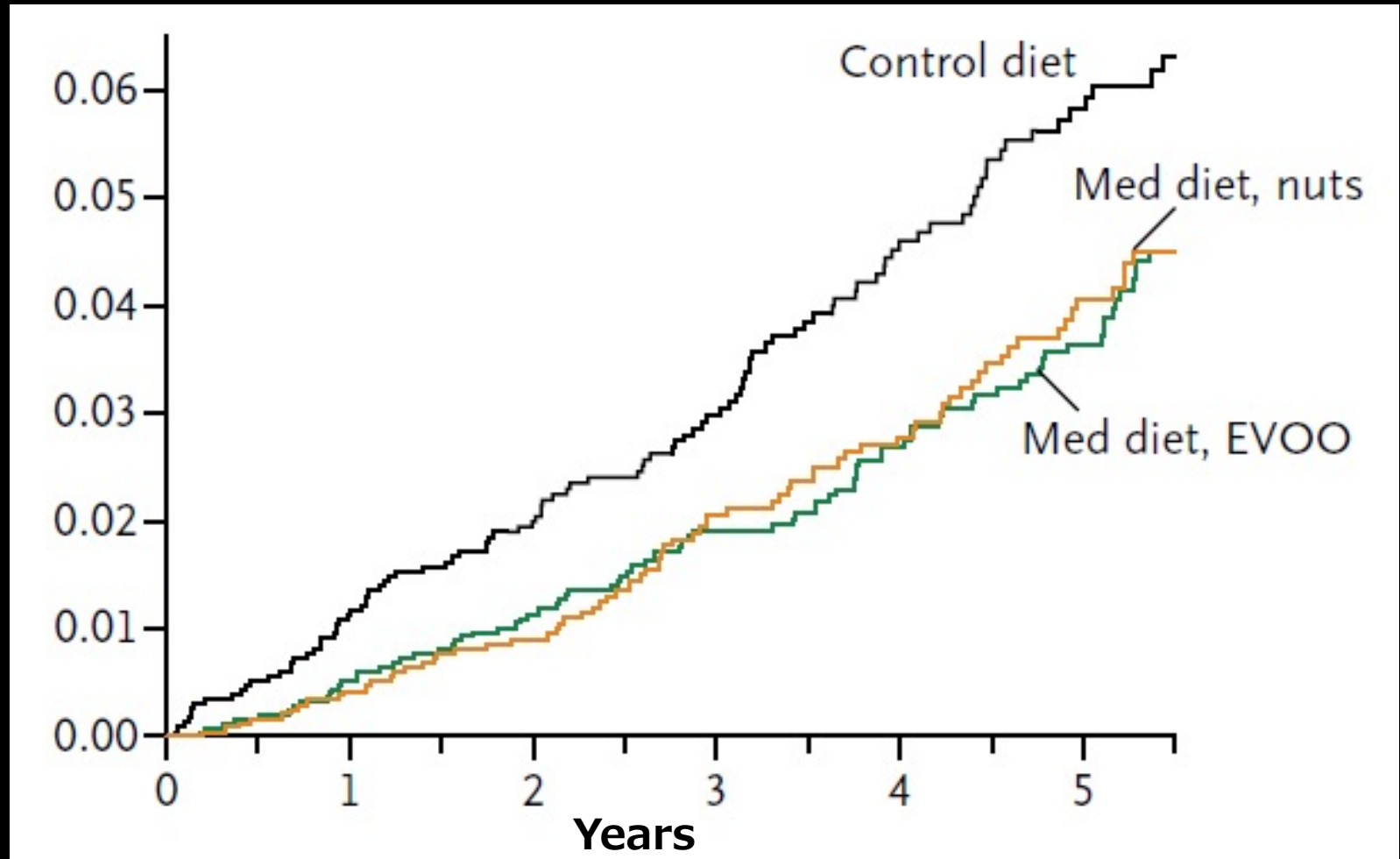| Food group	Food subgroup	Reference diet (g/day)	Possible ranges (g/day)
Whole Grains	All grains	232	0 to 60% of energy
Tubers/Starchy Vegetables	Potatoes, cassava	50	0 to 100
Vegetables	All vegetables	300	200 to 600
Fruits	All Fruits	200	100 to 300
Dairy Foods	Dairy Foods	250	0 to 500
Protein Sources	Beef, lamb, pork	14	0 to 28
	Chicken, other poultry	29	0 to 58
	Eggs	13	0 to 25
	Fish	28	0 to 100
	Dry beans, lentils, peas	50	0 to 100
	Soy	25	0 to 50
	Nuts	50	0 to 75
Added fats	Unsaturated oils	40	20-80
	Saturated oils	12	0 to 7
Added sugars	All sweeteners	31	0 to 31

1 glass of milk or equivalent

14.015c

Scientific Targets for Healthy Diets
(2500 Kcal/day)

Food group	Food subgroup	Reference diet (g/day)	Possible ranges (g/day)
Whole Grains	All grains	232	0 to 60% of energy
Tubers/Starchy Vegetables	Potatoes, cassava	50	0 to 100
Vegetables	All vegetables	300	200 to 600
Fruits	All Fruits	200	100 to 300
Dairy Foods	Dairy Foods	250	0 to 500
Protein Sources	**Beef, lamb, pork**	14	0 to 28
	Chicken, other poultry	29	0 to 58
	Eggs	13	0 to 25
	Fish	28	0 to 100
	Dry beans, lentils, peas	50	0 to 100
	Soy	25	0 to 50
	Nuts	50	0 to 75
Added fats	Unsaturated oils	40	20-80
	Saturated oils	12	0 to 7
Added sugars	All sweeteners	31	0 to 31

1 hamburger per week

14.015d

Scientific Targets for Healthy Diets
(2500 Kcal/day)

Food group	Food subgroup	Reference diet (g/day)	Possible ranges (g/day)
Whole Grains	All grains	232	0 to 60% of energy
Tubers/Starchy Vegetables	Potatoes, cassava	50	0 to 100
Vegetables	All vegetables	300	200 to 600
Fruits	All Fruits	200	100 to 300
Dairy Foods	Dairy Foods	250	0 to 500
Protein Sources	Beef, lamb, pork	14	0 to 28
	Chicken, other poultry	29	0 to 58
	Eggs	13	0 to 25
	Fish	28	0 to 100
	Dry beans, lentils, peas	50	0 to 100
	Soy	25	0 to 50
	Nuts	50	0 to 75
Added fats	Unsaturated oils	40	20-80
	Saturated oils	12	0 to 7
Added sugars	All sweeteners	31	0 to 31

2 servings per week

14.015e

Scientific Targets for Healthy Diets
(2500 Kcal/day)

Food group	Food subgroup	Reference diet (g/day)	Possible ranges (g/day)
Whole Grains	All grains	232	0 to 60% of energy
Tubers/Starchy Vegetables	Potatoes, cassava	50	0 to 100
Vegetables	All vegetables	300	200 to 600
Fruits	All Fruits	200	100 to 300
Dairy Foods	Dairy Foods	250	0 to 500
Protein Sources	Beef, lamb, pork	14	0 to 28
	Chicken, other poultry	29	0 to 58
	Eggs	13	0 to 25
	Fish	28	0 to 100
	Dry beans, lentils, peas	50	0 to 100
	Soy	25	0 to 50
	Nuts	50	0 to 75
Added fats	Unsaturated oils	40	20-80
	Saturated oils	12	0 to 7
Added sugars	All sweeteners	31	0 to 31

About 2 eggs per week

14.015f

Scientific Targets for Healthy Diets
(2500 Kcal/day)

Food group	Food subgroup	Reference diet (g/day)	Possible ranges (g/day)
Whole Grains	All grains	232	0 to 60% of energy
Tubers/Starchy Vegetables	Potatoes, cassava	50	0 to 100
Vegetables	All vegetables	300	200 to 600
Fruits	All Fruits	200	100 to 300
Dairy Foods	Dairy Foods	250	0 to 500
Protein Sources	Beef, lamb, pork	14	0 to 28
	Chicken, other poultry	29	0 to 58
	Eggs	13	0 to 25
	Fish	28	0 to 100
	Dry beans, lentils, peas	50	0 to 100
	Soy	25	0 to 50
	Nuts	50	0 to 75
Added fats	Unsaturated oils	40	20-80
	Saturated oils	12	0 to 7
Added sugars	All sweeteners	31	0 to 31

2 servings per week

14.015g

Scientific Targets for Healthy Diets
(2500 Kcal/day)

| Food group	Food subgroup	Reference diet (g/day)	Possible ranges (g/day)
Whole Grains	All grains	232	0 to 60% of energy
Tubers/Starchy Vegetables	Potatoes, cassava	50	0 to 100
Vegetables	All vegetables	300	200 to 600
Fruits	All Fruits	200	100 to 300
Dairy Foods	Dairy Foods	250	0 to 500
Protein Sources	Beef, lamb, pork	14	0 to 28
	Chicken, other poultry	29	0 to 58
	Eggs	13	0 to 25
	Fish	28	0 to 100
	Dry beans, lentils, peas	50	0 to 100
	Soy	25	0 to 50
	Nuts	50	0 to 75
Added fats	Unsaturated oils	40	20-80
	Saturated oils	12	0 to 7
Added sugars	All sweeteners	31	0 to 31

2-3 servings per day

1-2 servings per day

14.015h

Scientific Targets for Healthy Diets
(2500 Kcal/day)

Food group	Food subgroup	Reference diet (g/day)	Possible ranges (g/day)
Whole Grains	All grains	232	0 to 60% of energy
Tubers/Starchy Vegetables	Potatoes, cassava	50	0 to 100
Vegetables	All vegetables	300	200 to 600
Fruits	All Fruits	200	100 to 300
Dairy Foods	Dairy Foods	250	0 to 500
Protein Sources	Beef, lamb, pork	14	0 to 28
	Chicken, other poultry	29	0 to 58
	Eggs	13	0 to 25
	Fish	28	0 to 100
	Dry beans, lentils, peas	50	0 to 100
	Soy	25	0 to 50
	Nuts	50	0 to 75
Added fats	Unsaturated oils	40	20-80
	Saturated oils	12	0 to 7
Added sugars	All sweeteners	31	0 to 31

Total fat about 35%E

14.015i

Scientific Targets for Healthy Diets
(2500 Kcal/day)

Food group	Food subgroup	Reference diet (g/day)	Possible ranges (g/day)
Whole Grains	All grains	232	0 to 60% of energy
Tubers/Starchy Vegetables	Potatoes, cassava	50	0 to 100
Vegetables	All vegetables	300	200 to 600
Fruits	All Fruits	200	100 to 300
Dairy Foods	Dairy Foods	250	0 to 500
Protein Sources	Beef, lamb, pork	14	0 to 28
	Chicken, other poultry	29	0 to 58
	Eggs	13	0 to 25
	Fish	28	0 to 100
	Dry beans, lentils, peas	50	0 to 100
	Soy	25	0 to 50
	Nuts	50	0 to 75
Added fats	Unsaturated oils	40	20-80
	Saturated oils	12	0 to 7
Added sugars	All sweeteners	31	0 to 31

< one 12-oz soda

14.015j

Target 1 – Healthy Diets
2500 kcal/day

14.034
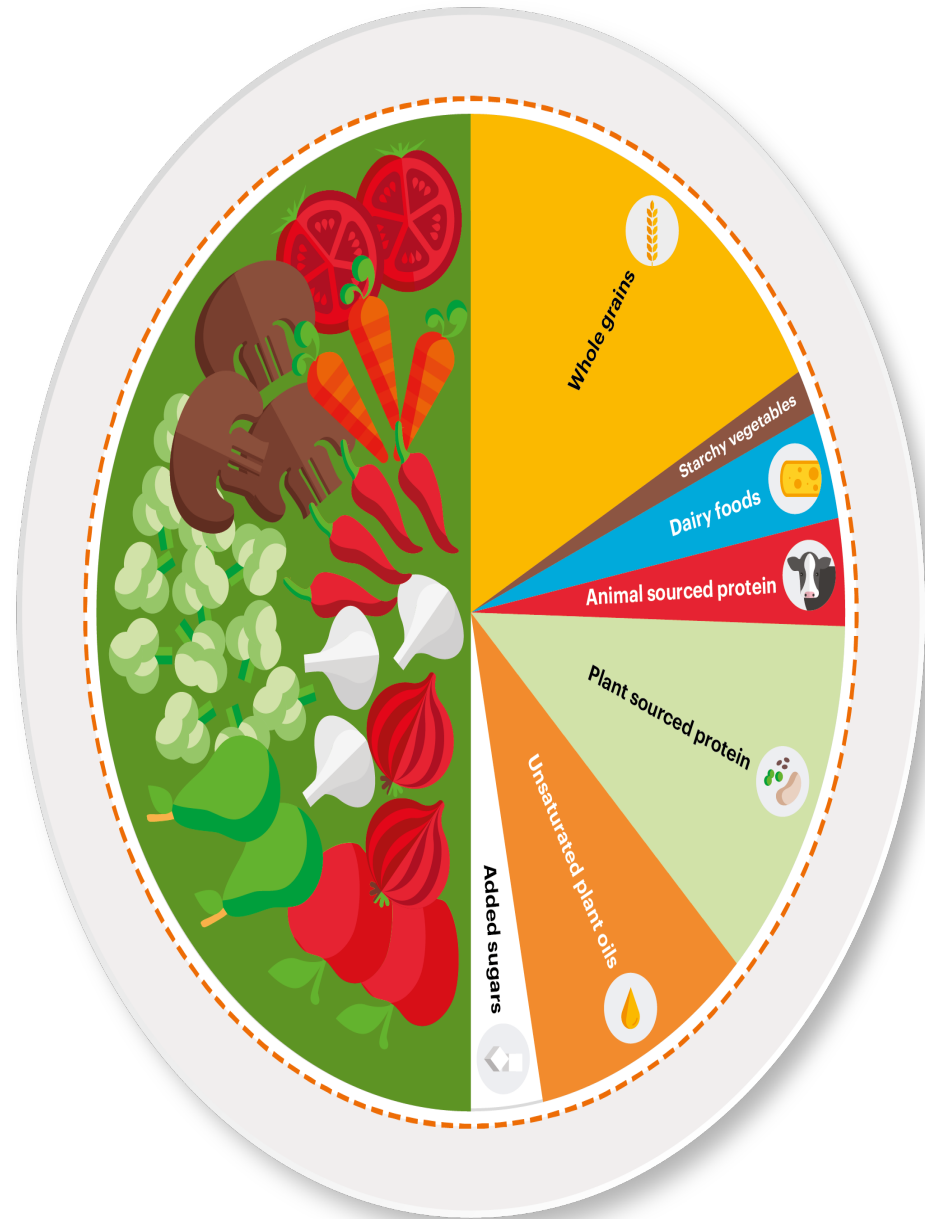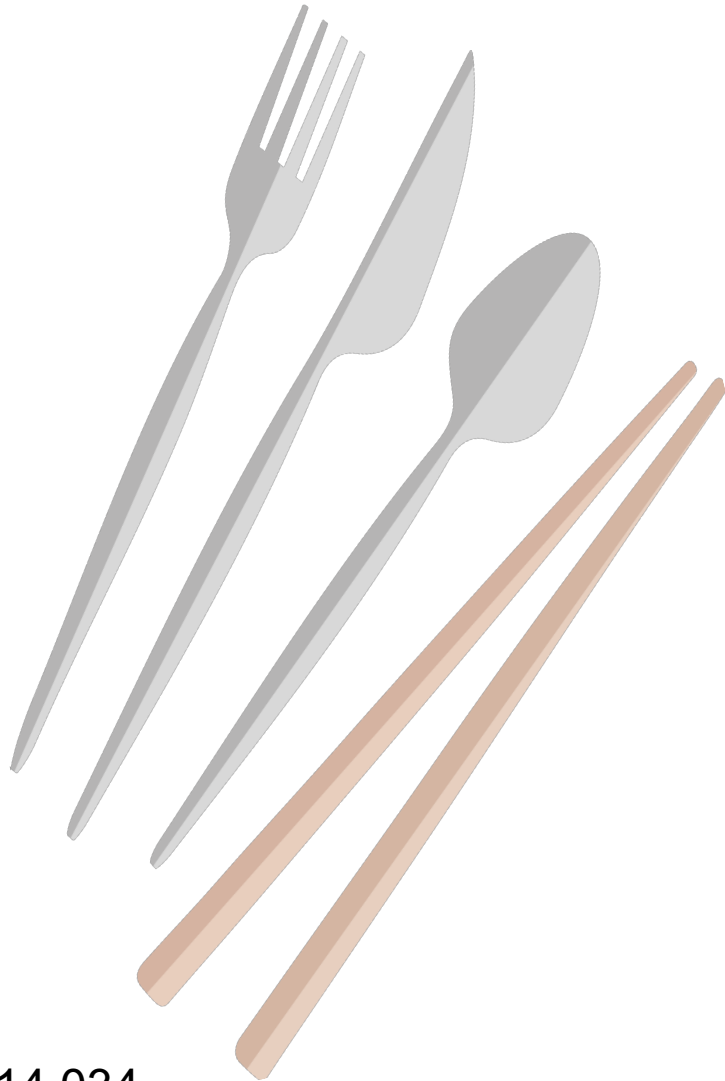
Reality Check: Protein Sources in Traditional Mediterranean Diet
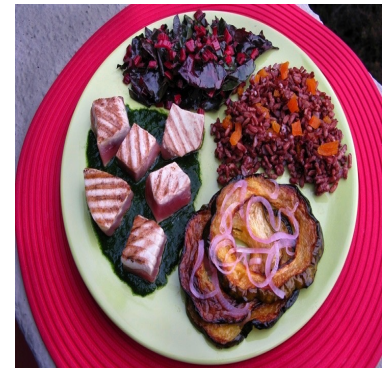
Total of red meat plus poultry:

**Greek men living in Crete in 1960s:
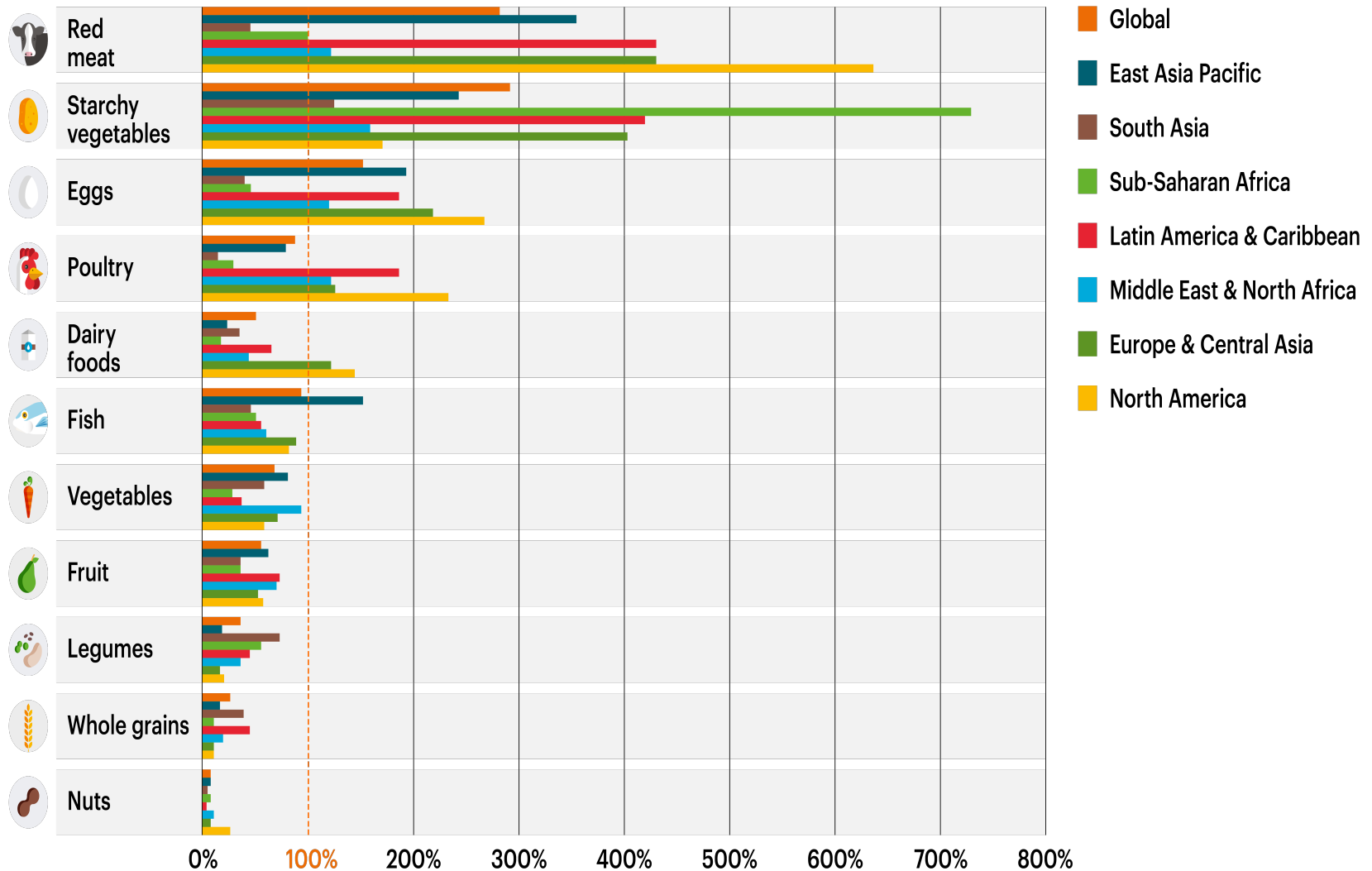35 grams per day**

(Willett WC et al. Am J Clin Nutr 1995)

**EAT-Lancet reference diet:
43 grams per day**

14.057

Samples of Planetary Health Plates

Current Intakes vs Planetary Health Diet

Legend:
- Global
- East Asia Pacific
- South Asia
- Sub-Saharan Africa
- Latin America & Caribbean
- Middle East & North Africa
- Europe & Central Asia
- North America

Food categories: Red meat, Starchy vegetables, Eggs, Poultry, Dairy foods, Fish, Vegetables, Fruit, Legumes, Whole grains, Nuts

X-axis: 0% to 800%

14.037

Substantial Health Benefits

Approach 1 Comparative Risk	19%	or	11.1 million adult deaths per year
Approach 2 Global Burden of Disease	22.4%	or	10.8 million adult deaths per year
Approach 3 Empirical Disease Risk	23.6%	or	11.6 million adult deaths per year

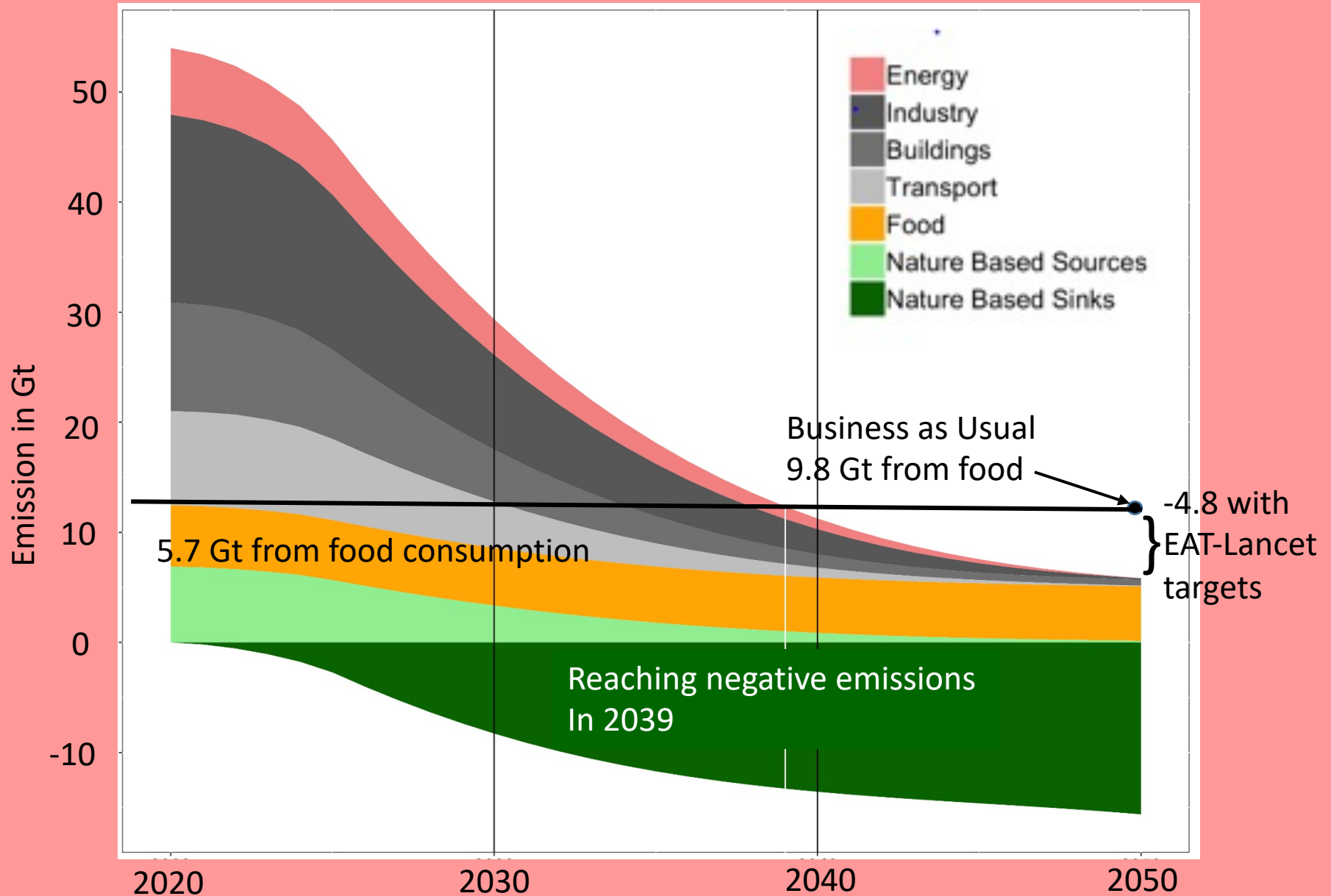# Environmental Effects per Serving of Food Produced

14.042
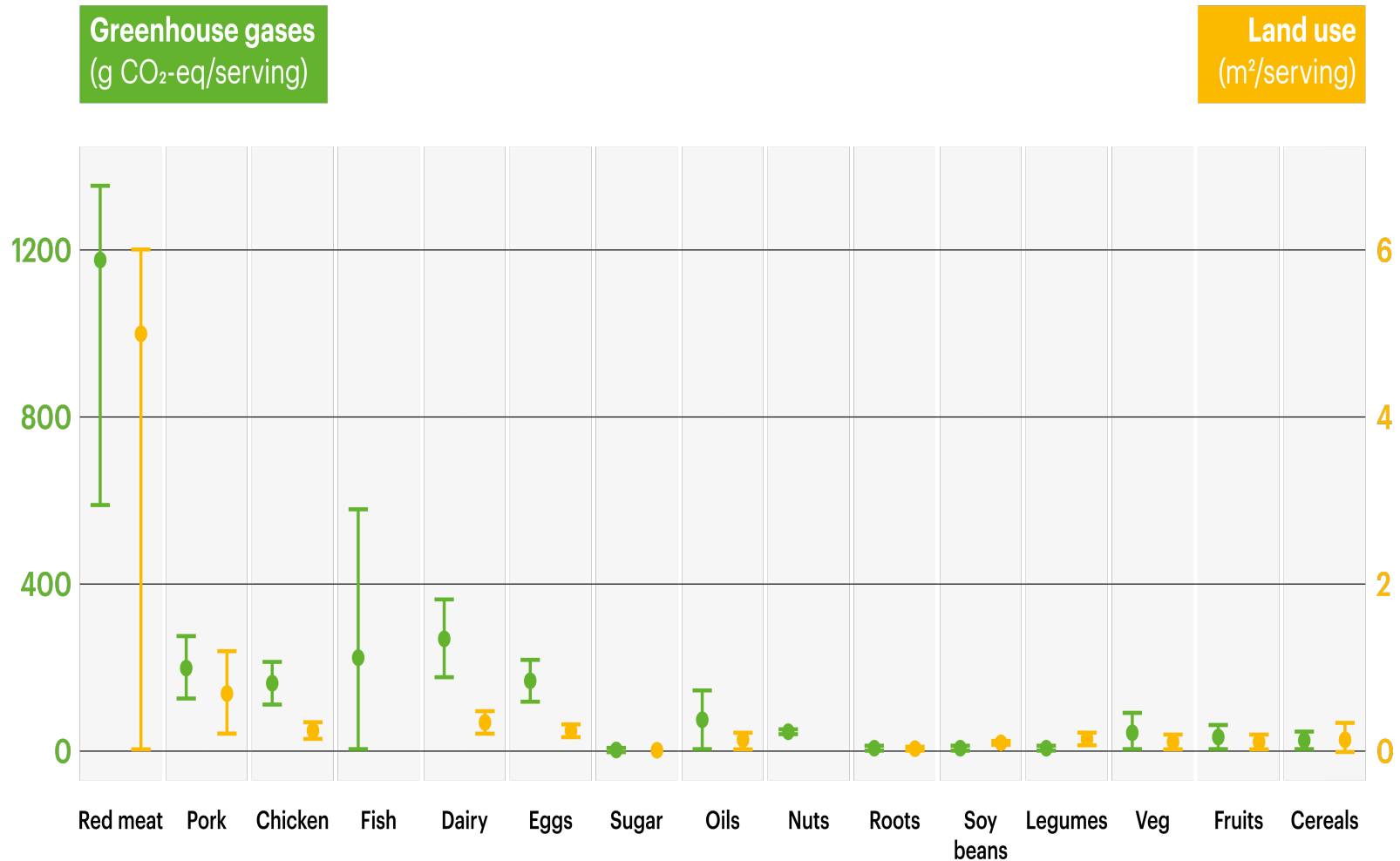
Scenarios for Control of Green House Gas Emission

Estimated Green House Gas Emissions (Gty)

Food Production Boundary	5.0
Baseline 2010	5.2
Business as Usual, 2050	9.8
Adopt Planetary Diet Targets	5.0
+ production improvement	4.4
+ 50% waste reduction	4.0

40.025

GHG Emissions: IPCC Path to less than 2° C Increase

Emission in Gt

Business as Usual
9.8 Gt from food

-4.8 with EAT-Lancet targets

5.7 Gt from food consumption

Reaching negative emissions
In 2039

Legend:
- Energy
- Industry
- Buildings
- Transport
- Food
- Nature Based Sources
- Nature Based Sinks

14.087

Feeding 10 billion people a healthy diet within safe planetary boundaries is possible and will improve the health and well being of billions of people. This could allow us to pass onto our children a viable planet.

Delicious Food to Eat in Lithuania ...
toptravelsights.com

Lithuanian recipes, Lith...
pinterest.co.uk

Lithuanian Cuisine | Food, Traditiona...
pinterest.com

Lithuanian Food? – Cooking in America ...
youtube.com

Lithuanian Food Favorites ...
2foodtrippers.com

17.Food, wine and more
vilnews.com

What's Traditional Lithuanian Food ...
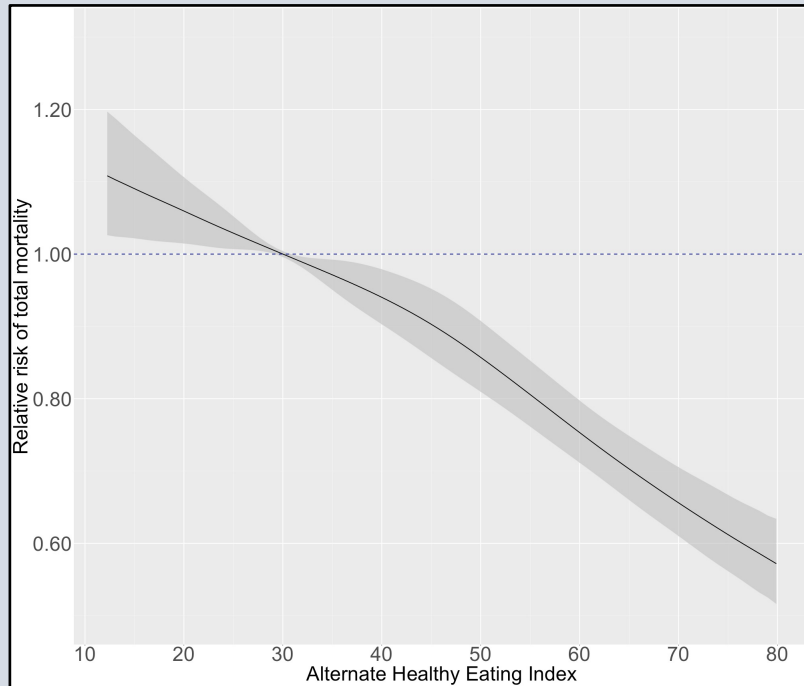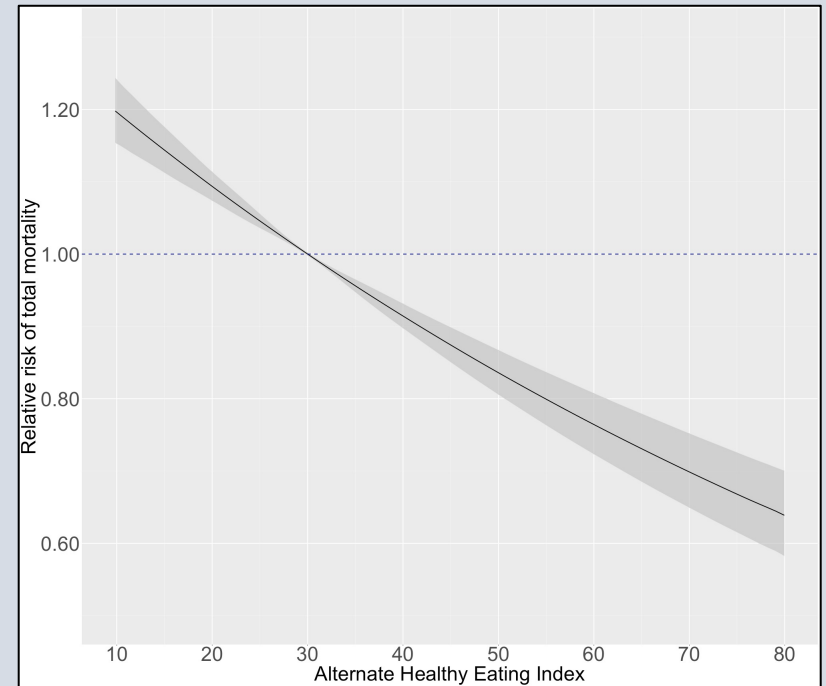curioustovisit.com

Related

29.787

Relative risk of Mortality in NHS and HPFS by AHEI

Nurses' Health Study (1984-2014)

Health Professionals Follow-Up Study (1984-2014)

Multivariable Cox proportional hazards model simultaneously adjusted for age, total energy intake, race/ethnicity, marital status, physical activity, smoking status, alcohol consumption, multivitamin use, current aspirin use, family histories of myocardial infarction, diabetes and cancer, baseline histories of hypertension and hypercholesterolemia, and menopausal status and hormone use in women

(Wang D et al., J. Nutr 2019)

14.066

Scenarios

			GHG emissions	Cropland use	Water use	Nitrogen application	Phosphorus application	Biodiversity loss
Food production boundary			5.0 (4.7–5.4)	13 (11.0–15.0)	2.5 (1.0–4.0)	90 (65.0–140.0)	8 (6.0–16.0)	10 (1–80)
Baseline in 2010			5.2	12.6	1.8	131.8	17.9	100–1000
Production (2050)	Waste (2050)	Diet (2050)						
BAU	Full waste	BAU	9.8	21.1	3.0	199.5	27.5	1,043
BAU	Full waste	Dietary shift	5.0	21.1	3.0	191.4	25.5	1,270
BAU	Halve waste	BAU	9.2	18.2	2.6	171.0	23.2	684
BAU	Halve waste	Dietary shift	4.5	18.1	2.6	162.6	21.2	885
PROD	Full waste	BAU	8.9	14.8	2.2	187.3	25.5	206
PROD	Full waste	Dietary shift	4.5	14.8	2.2	179.5	24.1	351
PROD	Halve waste	BAU	8.3	12.7	1.9	160.1	21.5	50
PROD	Halve waste	Dietary shift	4.1	12.7	1.9	151.7	20.0	102
PROD+	Full waste	BAU	8.7	13.1	2.2	147.6	16.5	37
PROD+	Full waste	Dietary shift	4.4	12.8	2.1	140.8	15.4	34
PROD+	Halve waste	BAU	8.1	11.3	1.9	128.2	14.2	21
PROD+	Halve waste	Dietary shift	4.0	11.0	1.9	121.3	13.1	19

14.043

National Disease Prevention and Health Promotion Initiative

Schools

Health Care Providers

Work Sites

Media

Physical Environment

Food Environment

Monitoring & Evaluation

Economic Analysis/Policy

Vision: Healthy Choices Are Easy Choices for All

www.neconinfo.org

AHEI and cost. International correlation (D Wang et al. unpublished)

Pearson Correlation Coefficient =0.10

Alternate Healthy Eating Index vs log10 (Gross National Income Per Capita in US$)

40.032