GOBIERNO DE ESPAÑA
MINISTERIO DE SANIDAD, CONSUMO Y BIENESTAR SOCIAL

Madrid, 24 de Octubre de 2019

OCTAVAS JORNADAS CIENTÍFICAS DEL

CEIPV

Comité Español Interdisciplinario para la Prevención Vascular

Hacia una alimentación cardiosaludable y sostenible

Miguel A. Martínez-González, Madrid, 24 Octubre, 2019







Universidad de Navarra School of Medicine

HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH Powerful ideas for a healthier world

SUN

Prediméd Prevención con Dieta Mediterránea

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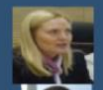
Instituto de Salud Carlos III

Prediméd
Prevención con Dieta Mediterránea

Instituto de Salud Carlos III

prediméd plus

11 centers of PREDIMED

1. Univ. **Navarra (Epidemiology)**– MA Martínez-González 
2. Univ. **Reus (Nutrition)**– Jordi Salas-Salvadó 
3. IMIM **Barcelona (Lipids)**– Montse Fitó 
4. Hosp. Clinic **Barcelona (Internal Med.)**– Ramón Estruch 
5. Univ. **Valencia (Genetics)**– Dolores Corella 
6. Hosp. **Álava (Cardiology)**– Fernando Arós 
7. Univ. **Málaga (Epidemiology)**– Enrique Gómez-Gracia 
8. **Primary Care- Sevilla**– José Lapetra 
9. Son Espases-**Mallorca (Cardiology)**– Miquel Fiol 
10. Univ. **Las Palmas (Epidemiology)**– Lluis Serra-Majem 
11. H. Belvitge **Barcelona (Internal Med.)**– Xavier Pintó 

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Univ. **Mallorca (Phys. Activity)**– J. A. Tur 
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Hosp. Virgen Victoria **Málaga (Endocrin.)**– F. Tinahones 
Hosp. Clinic **Barcelona (Endocrin.)**– Josep Vidal 
Univ. M. Hernandez, **Alicante (Epidemiology)**- J. Vioque 
Univ. **Granada (Epidemiology)**– A. Bueno 
F. Jiménez-Díaz **Madrid (Endocrin.)**– Clotilde Vázquez 
Univ. **Jaén (Epidemiology)**- M. Delgado-Rodríguez 
IMDEA **Madrid (Nutrition)**– J.M. Ordovás 
H.C. San Carlos **Madrid (Endocrin.)**– M.A. Rubio 
Univ. **León (Primary Care)**– Vicente Martín 

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Centro de Investigación Biomédica en Red
Fisiopatología de la Obesidad y Nutrición



EPIDEMIOLOGIA NUTRICIONAL

EVIDENCIA OBSERVACIONAL

CEIPV

DISENSOS

PREDIMED Y PREDIMED-Plus

EPIDEMIOLOGIA NUTRICIONAL

EVIDENCIA OBSERVACIONAL

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DISENSOS

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American Heart Association's Life's Simple 7:

Defining and Setting National Goals for Cardiovascular Health Promotion and Disease Reduction
The American Heart Association's Strategic Impact Goal Through 2020 and Beyond

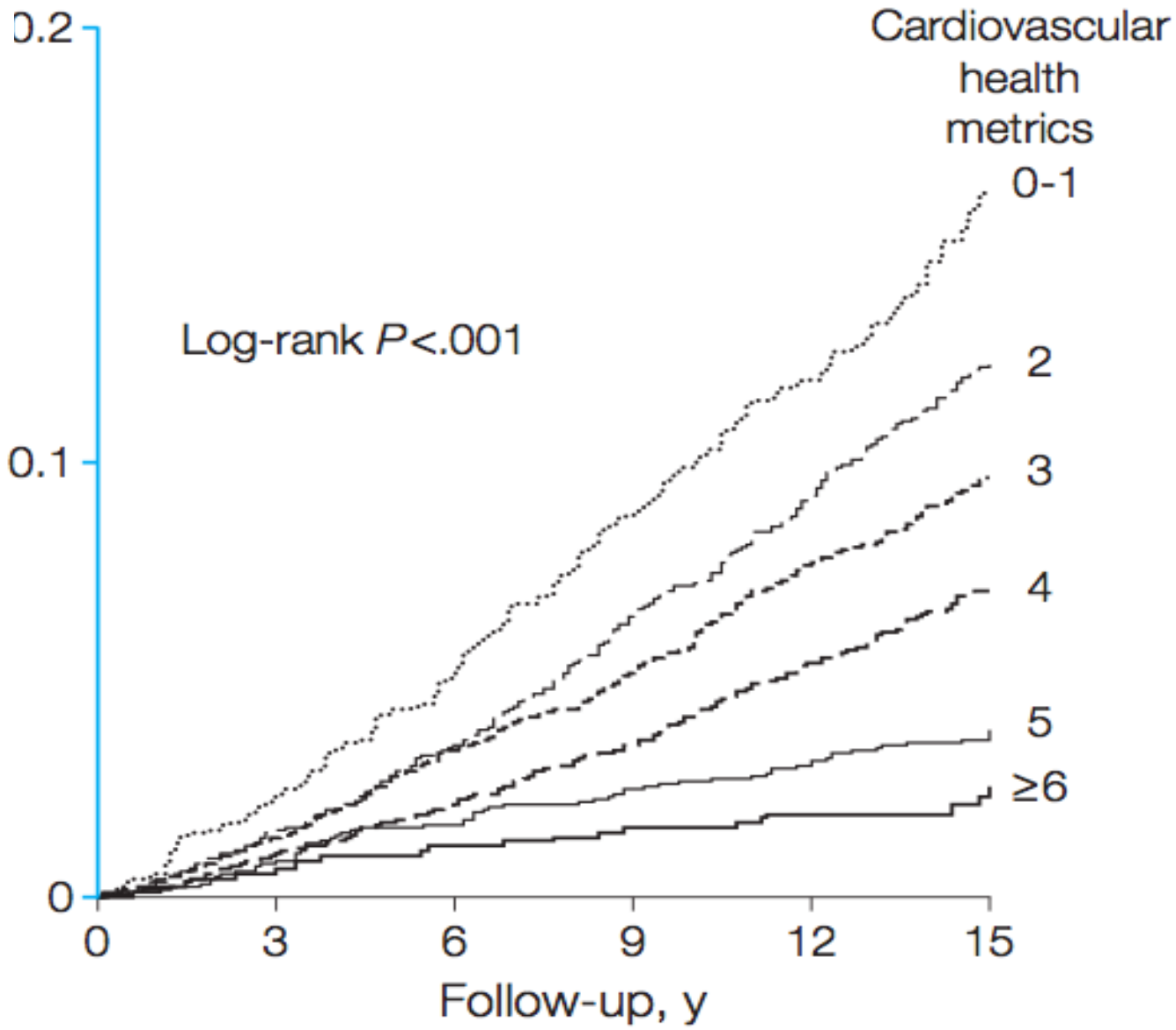
Circulation. 2010;121:586-613

Trends in Cardiovascular Health Metrics and Associations With All-Cause and CVD Mortality Among US Adults

Quanhe Yang, PhD
Mary E. Cogswell, DrPH
W. Dana Flanders, MD, ScD
Yuling Hong, MD, PhD
Zefeng Zhang, MD, PhD
Fleetwood Loustalot, FNP, PhD
Cathleen Gillespie, MS
Robert Merritt, BA, MA
Frank B. Hu, MD, PhD

JAMA. 2012;307:1273-83

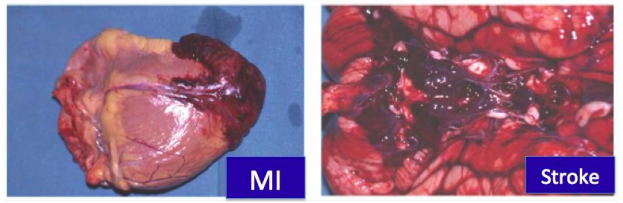
Cardiovascular disease mortality

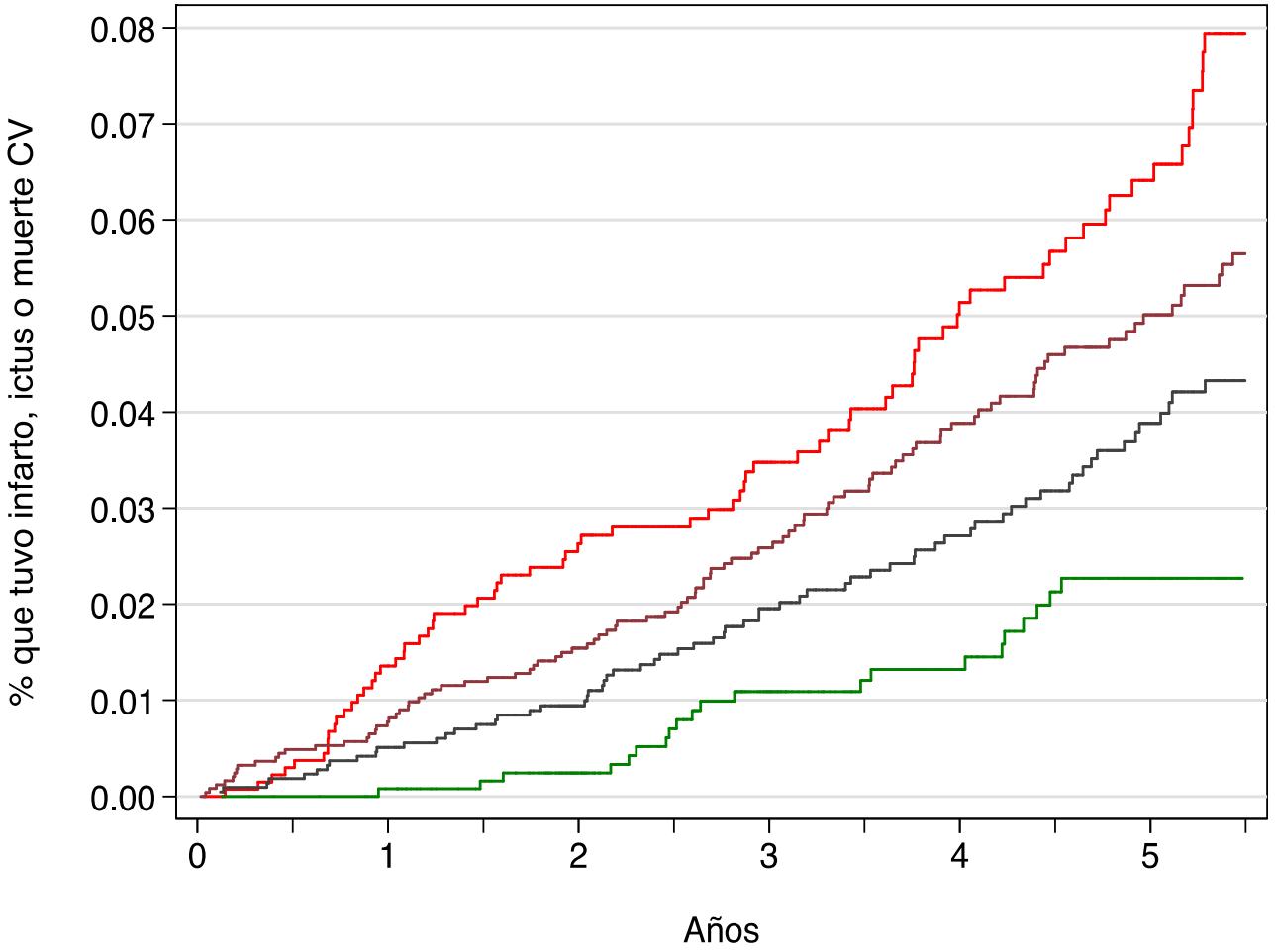


Prediimed
Prevención con Dieta Mediterránea

PRIMARY END-POINT

Myocardial Infarction– Heart Attack
Cerebrovascular disease– Stroke
Cardiovascular deaths





Métricas de salud cardiovascular

1 ó ninguna (1406 participantes)

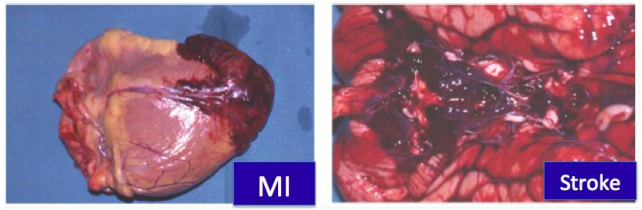
2 (2541 participantes)

3 (2216 participantes)

4 o más (1284 participantes)

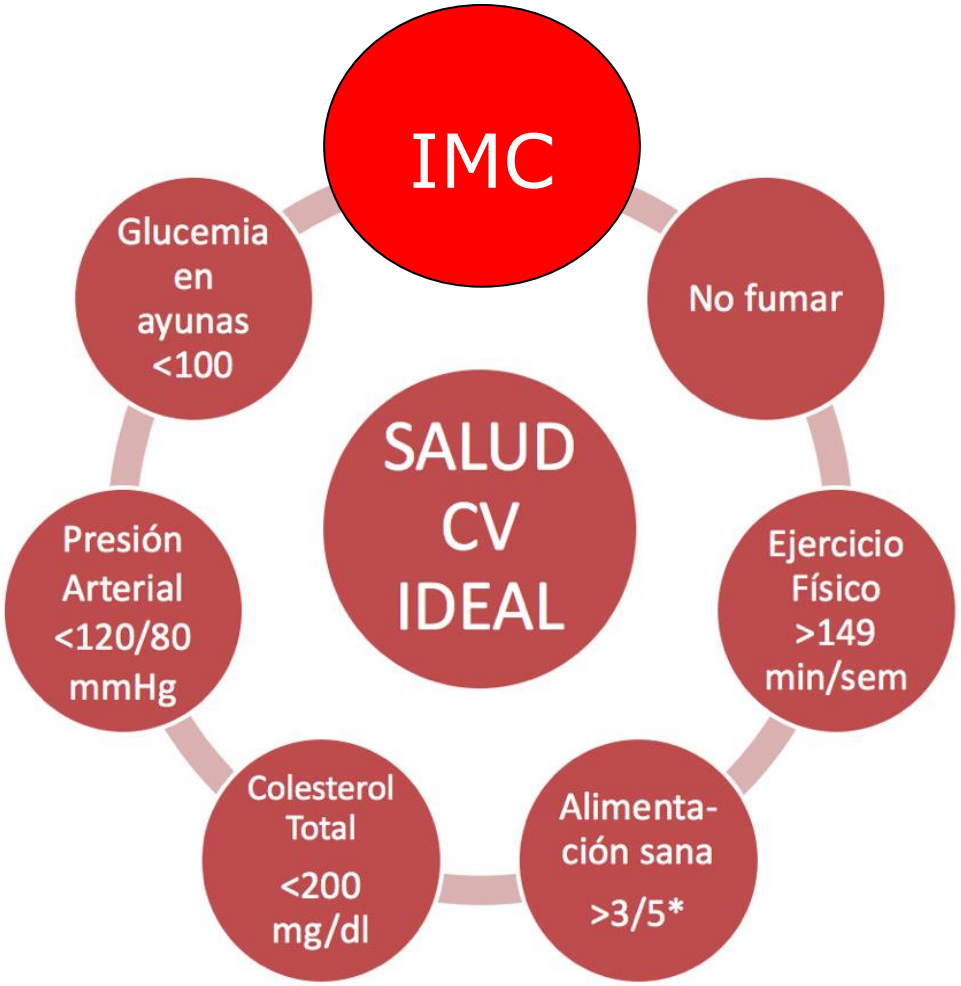
Impacto de *Life's Simple 7* en la incidencia de eventos cardiovasculares mayores en adultos españoles con alto riesgo de la cohorte del estudio PREDIMED

Myocardial Infarction– Heart Attack
Cerebrovascular disease– Stroke
Cardiovascular deaths



Rev Esp Cardiol. 2019 Sep 6.

Javier Díez-Espino[a,b,c,*], Pilar Buil-Cosiales[a,b,c], Nancy Babio[b,d], Estefanía Toledo[b,c], Dolores Corella[b,e], Emilio Ros[f], Montserrat Fitó[b,g], Enrique Gómez-Gracia[h], Ramón Estruch[b,i], Miquel Fiol[b,j], José Lapetra[b,k], Angel Alonso-Gómez[b,l,k], Lluis Serra-Majem[b,m,n], Xavier Pintó[b,o], José V. Sorlí[b,e], Miguel A. Muñoz[b,p], Josep Basora[b,d] y Miguel Á. Martínez-González[b,c,q]



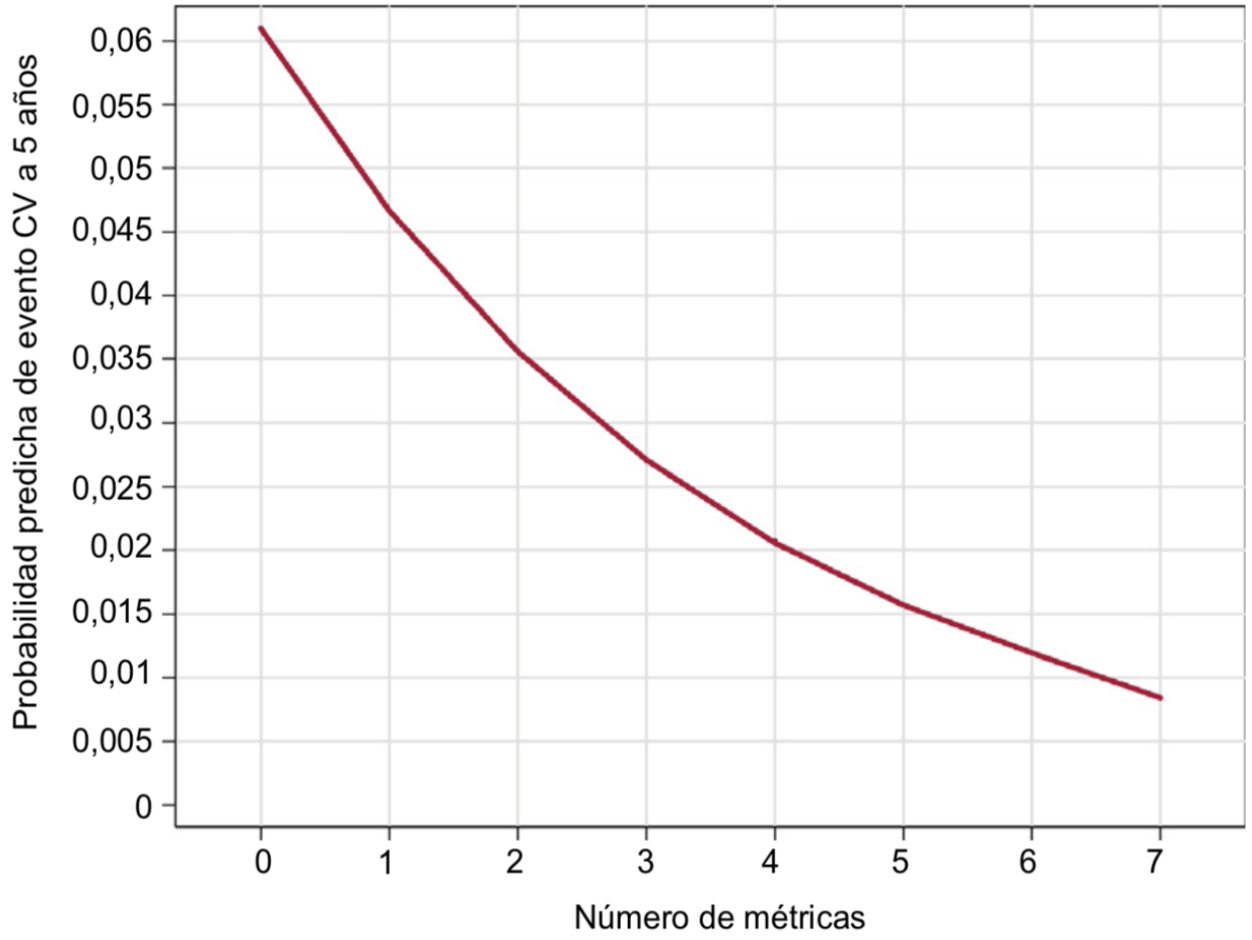
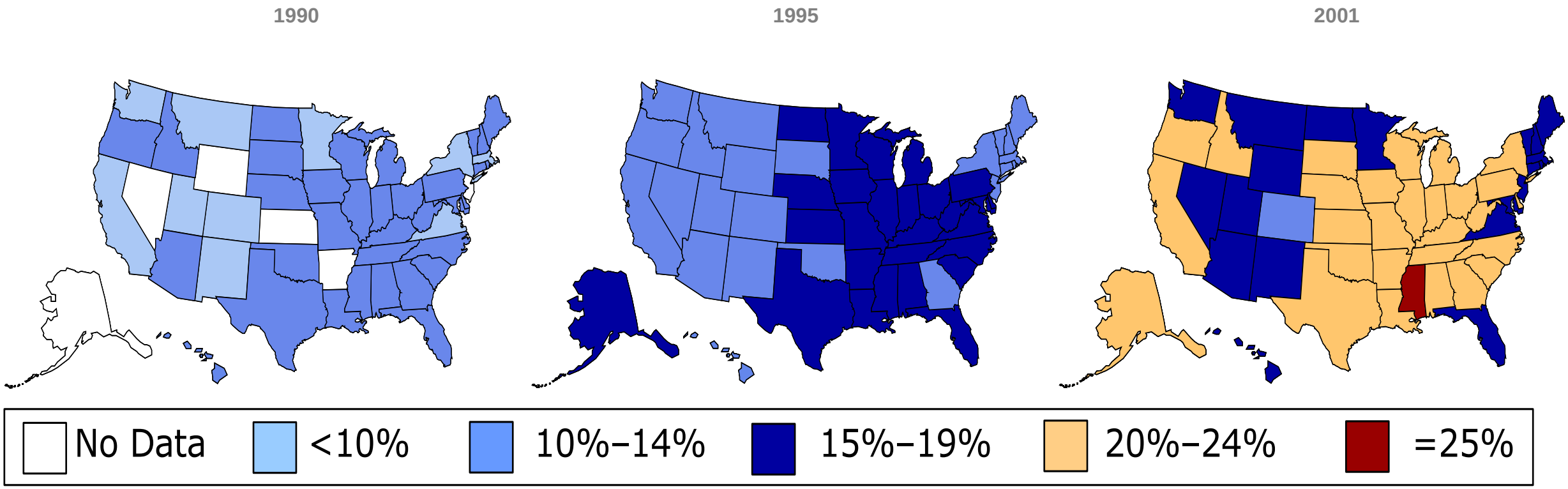


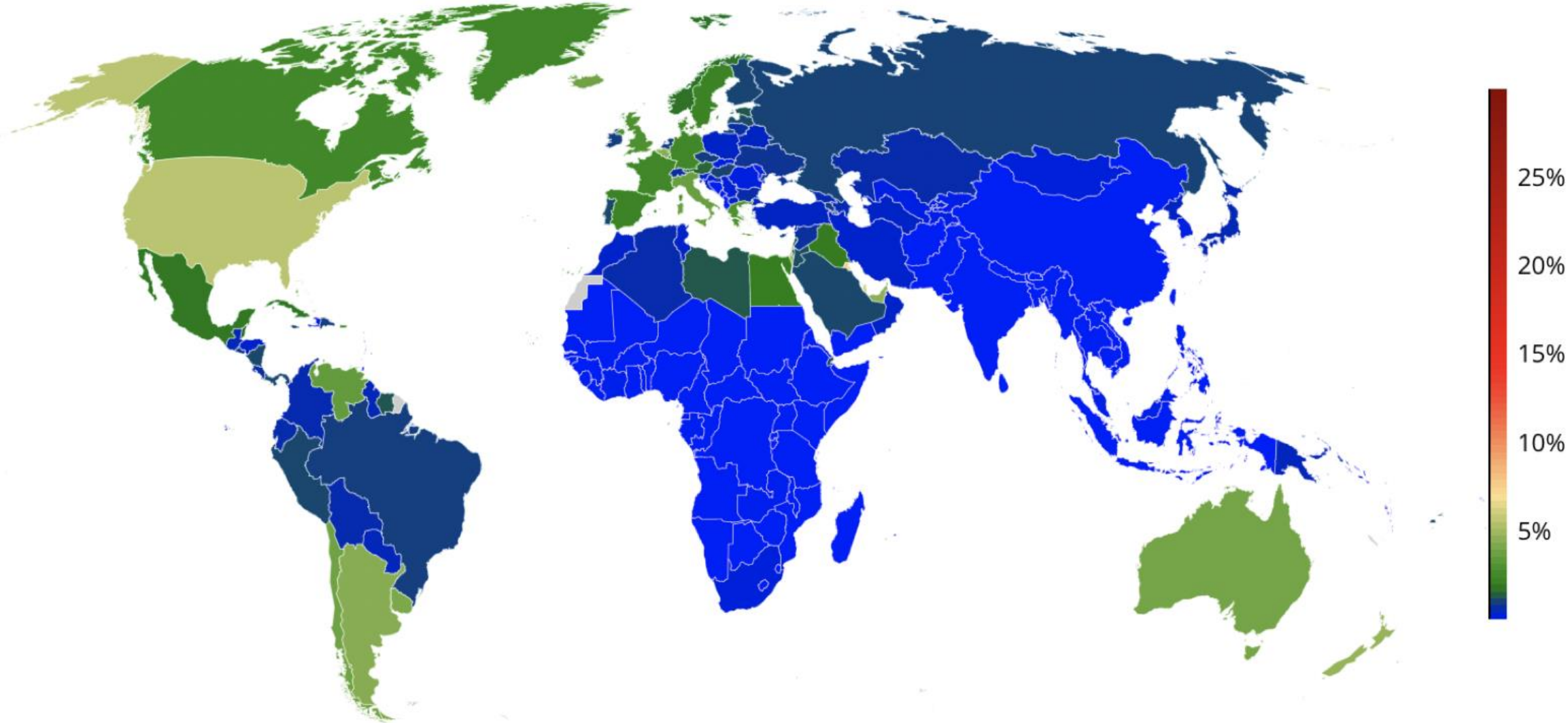
Figura 2. Probabilidad predicha de padecer un evento cardiovascular (CV) tras una mediana de 4,8 años de seguimiento, según el número de métricas.

The Growing Problem

Trends in obesity prevalence among US adults



Prevalencia de obesidad. Chicas 1975

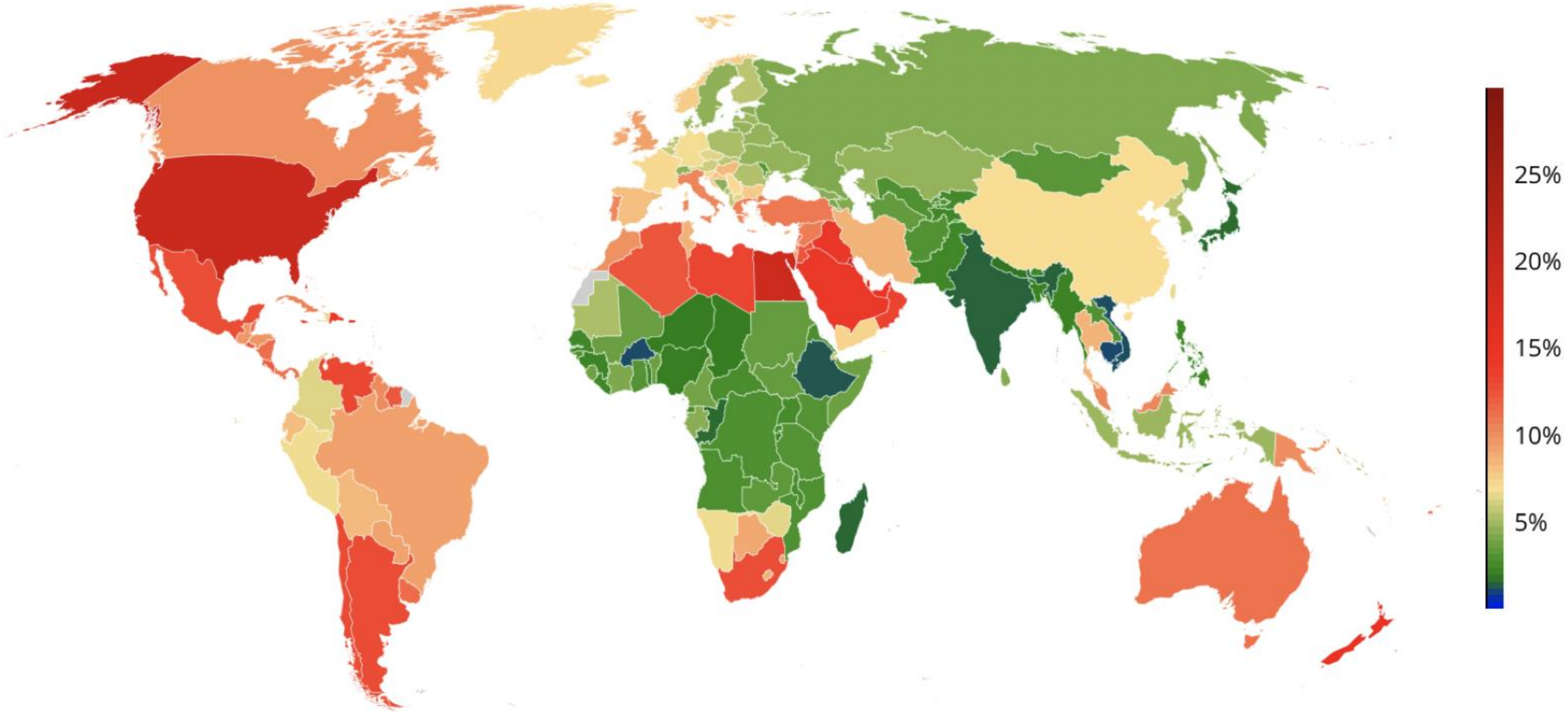


Obesity refers to BMI >2SD from the median of the WHO growth reference.

Age-standardised estimates for children and adolescents aged 5 to 19 years.

Source: http://www.ncdrisc.org/obesity-prevalence-map-ado.html

Prevalencia de obesidad. Chicas 2016



Obesity refers to BMI >2SD from the median of the WHO growth reference.
Age-standardised estimates for children and adolescents aged 5 to 19 years.

Source: http://www.ncdrisc.org/obesity-prevalence-map-ado.html

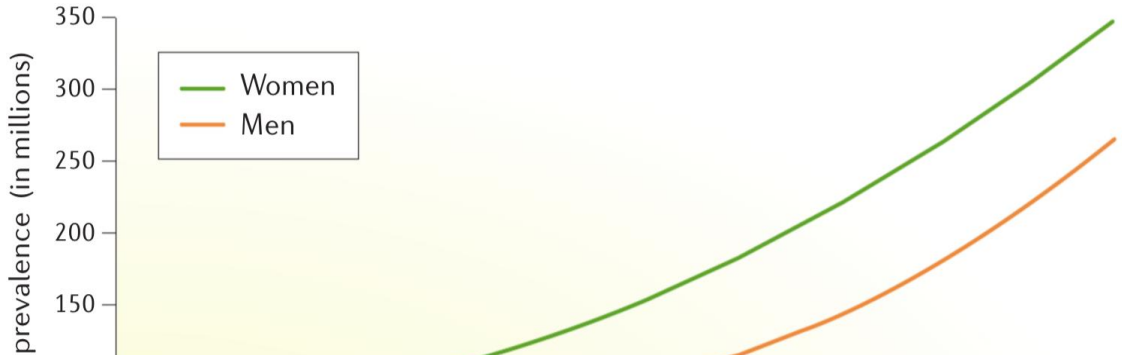
Obesity

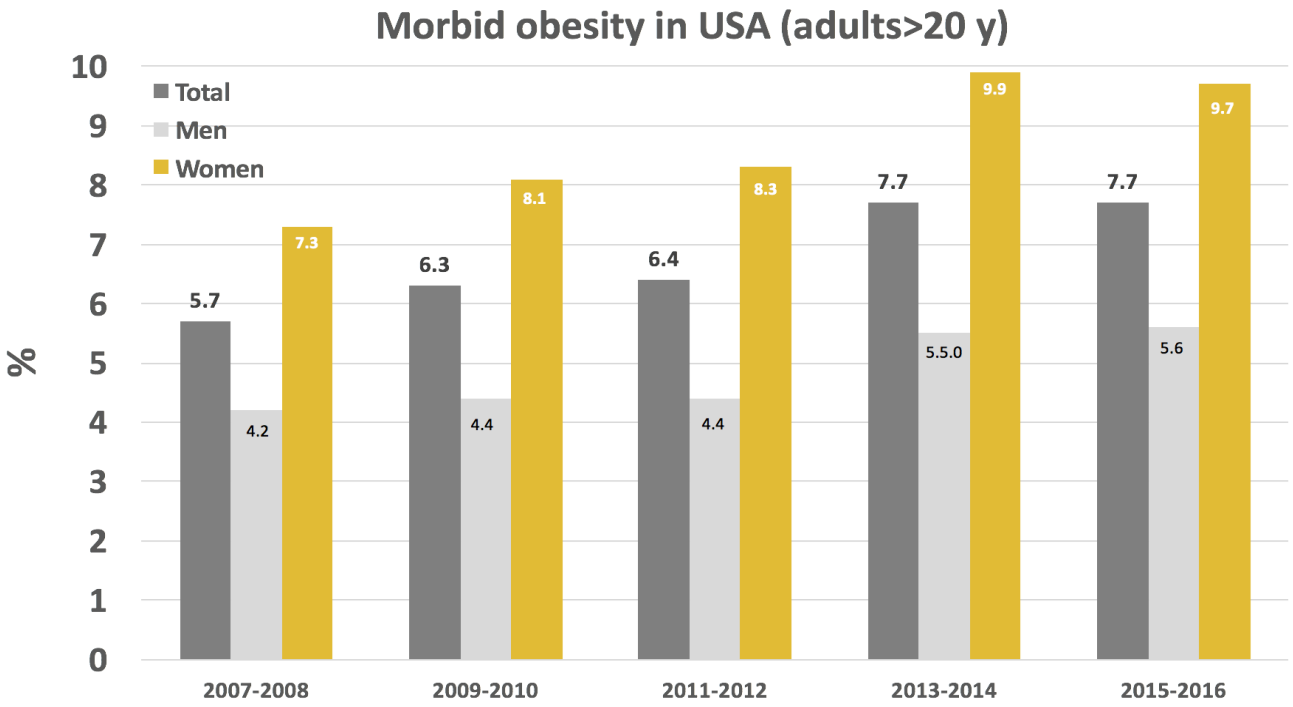
nature REVIEWS DISEASE PRIMERS 2017;3:17034

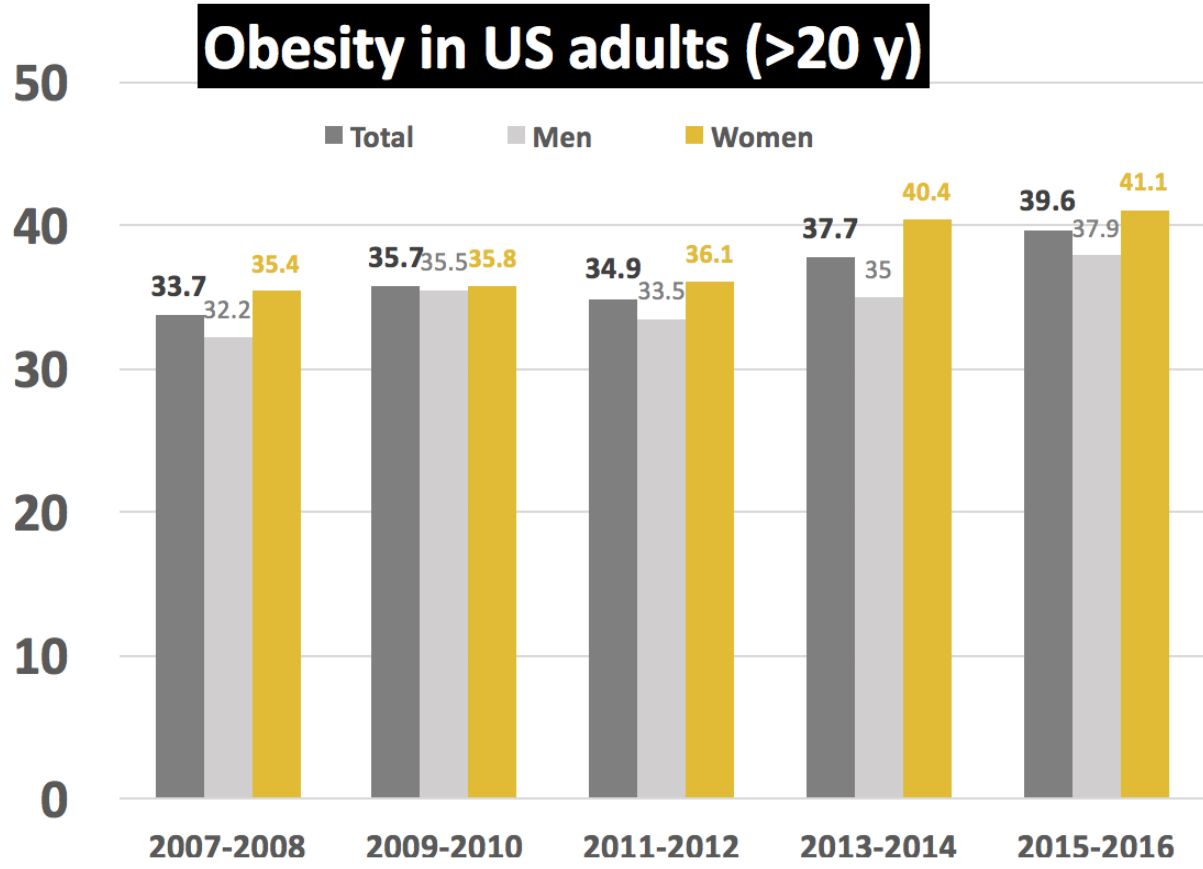
Pedro González-Muniesa[1–3], Miguel-Angel Mártinez-González[2–5], Frank B. Hu[5], Jean-Pierre Després[6], Yuji Matsuzawa[7], Ruth J. F. Loos[8], Luis A. Moreno[3,9], George A. Bray[10] and J. Alfredo Martinez[1–3,11]

concluded that by 2025 the global prevalence of obesity will be 18% in men and more than 21% in women, with 6% of men and 9% of women having a BMI greater than 40 kg/m². In 2017, obesity was declared a chronic, relapsing disease process by the World Obesity Federation.[2] The prevalence of type 2 diabetes and other chronic metabolic diseases will increase following rising trends in obesity

Hales et al. JAMA 2018;319:1723-5

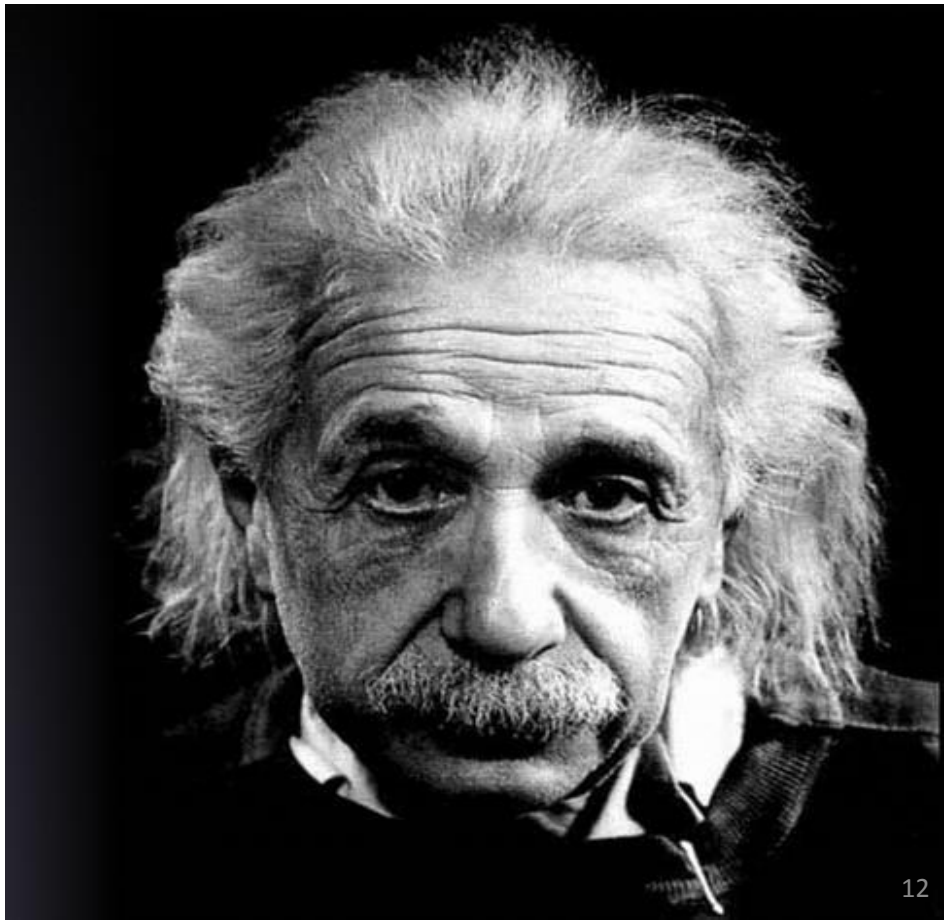






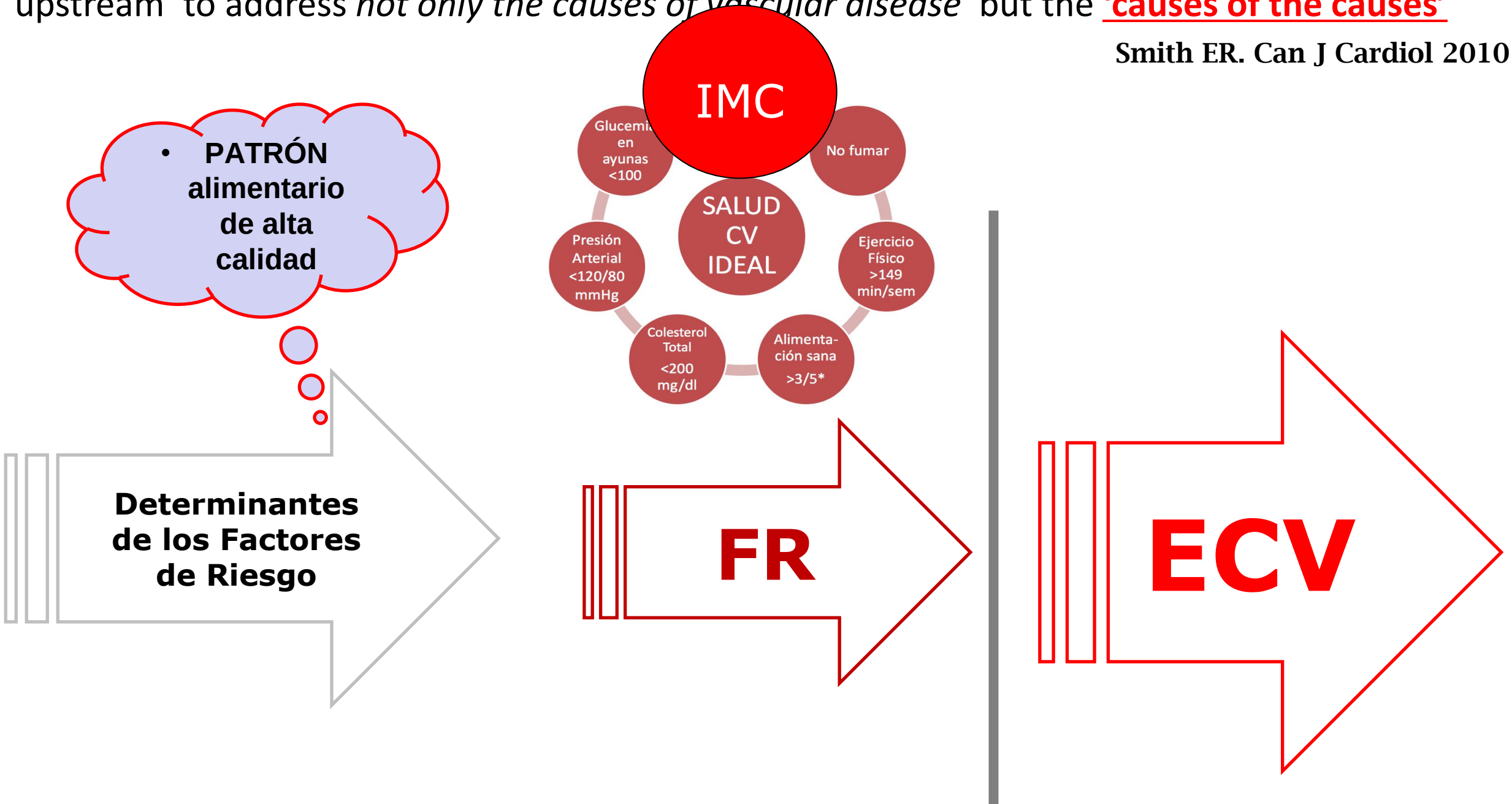
Albert Einstein:

- Una persona lista resuelve problemas
- Una persona sabia los **evita**



to effectively achieve the degree of prevention possible, we needed to move the emphasis ‘upstream’ to address *not only the causes of vascular disease* but the **‘causes of the causes’**

Smith ER. Can J Cardiol 2010



VIEWPOINT

Lifespan Weighed Down by Diet

JAMA June 7, 2016 Volume 315, Number 21 2269

David S. Ludwig, MD, PhD
New Balance Foundation Obesity Prevention Center, Boston Children's Hospital and Harvard Medical School, Boston, Massachusetts.

Since the end of the Civil War until the late 20th century, lifespan increased rapidly in the United States, a tremendous public health triumph brought about by a more dependable food supply, improved sanitation, and advances in medical care. In 1850, life expectancy among whites was an estimated 38 years for men and 40 years for women. These numbers nearly doubled by 1980, to

those most seve
(ie, counties loc
and Midwest). T
almost certainly
children—with h
than ever before
care may prever

The data from the latest CDC report suggest that a tipping point has been reached beyond which technological advances may no longer compensate.

Enfermedades crónicas

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

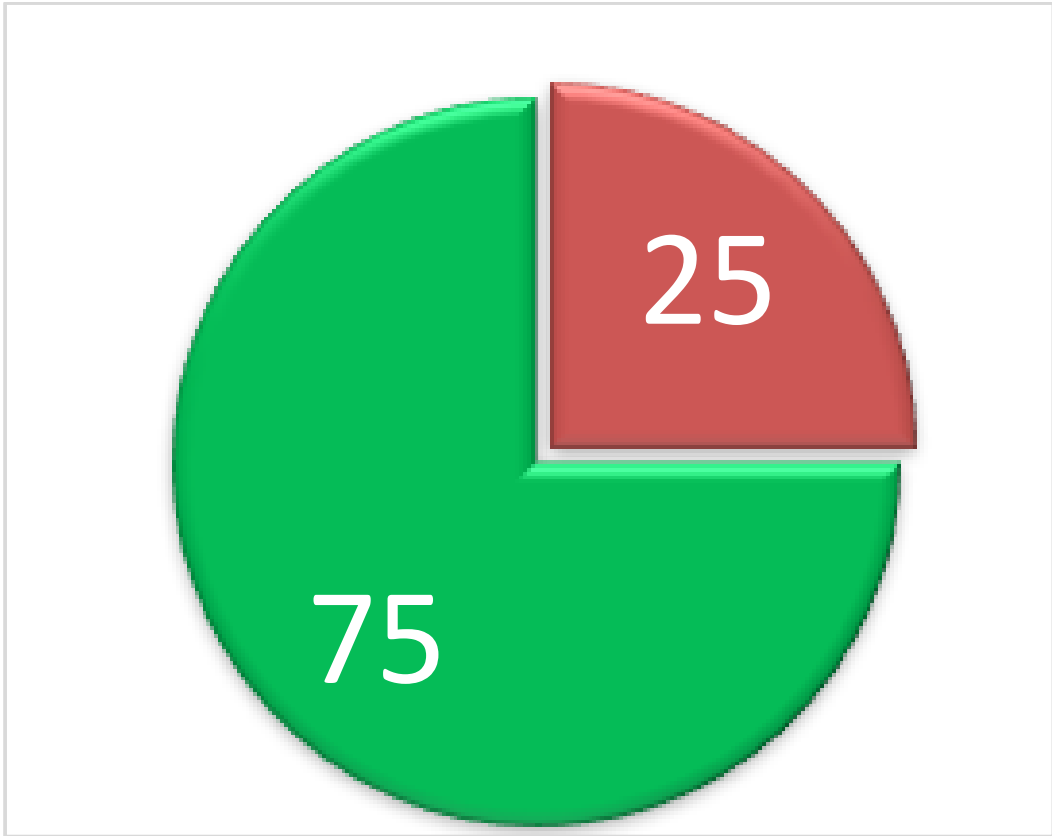
Cardiovasculares, cancer, diabetes...

- Son responsables de

  7 de cada 10 muertes (EE.UU.)

- y del

  75% del gasto nacional en salud



Estas enfermedades crónicas

son ampliamente prevenibles

- dieta sana
- actividad física
- evitar el tabaco
- recibir servicios preventivos,
  chequeos (cribados) y vacunaciones

The New York Times

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HEALTH

Life Expectancy in U.S. Declines Slightly, and Researchers Are Puzzled

By KATIE ROGERS DEC. 8, 2016

- **PATRÓN alimentario de alta calidad**



Annals of Internal Medicine

IDEAS AND OPINIONS

Ominous Reversal of Health Gains in the United States: Time to Rethink Research Priorities?

K.M. Venkat Narayan, MD; Shivani A. Patel, PhD; Solveig A. Cunningham, PhD; and James Curran, MD

After decades of gains, the average life expectancy in the United States has been declining since 2015 (1, 2). This phenomenon is driven by increases in midlife mortality rates among whites, Hispanics, Asians, and Pacific Islanders, which are caused by various preventable conditions, including overdose, alcohol-related illness, suicide, homicide, hypertensive disease, metabolic disorders, some types of cancer, and chronic respiratory illness (**Figure**) (1). The pattern and nature of this trend point to potential underlying systemic fault lines and call for a rethinking of the nation's approach to investigating and addressing health.

(6). At least 60% of extramural research funded by the National Institutes of Health targets subcellular biology together with bioinformatics and technology, motivating investigators and academic enterprises to prioritize these aspects (7). Doing so only leads to expensive therapies with marginal benefits (8), and the massive investments in such subcellular biological fields as genomics, metabolomics, proteomics, and stem cells have yet to deliver substantial results (7).

If we are serious about promoting health gains in the United States, we must examine current and alternative priorities in our investment in health research.

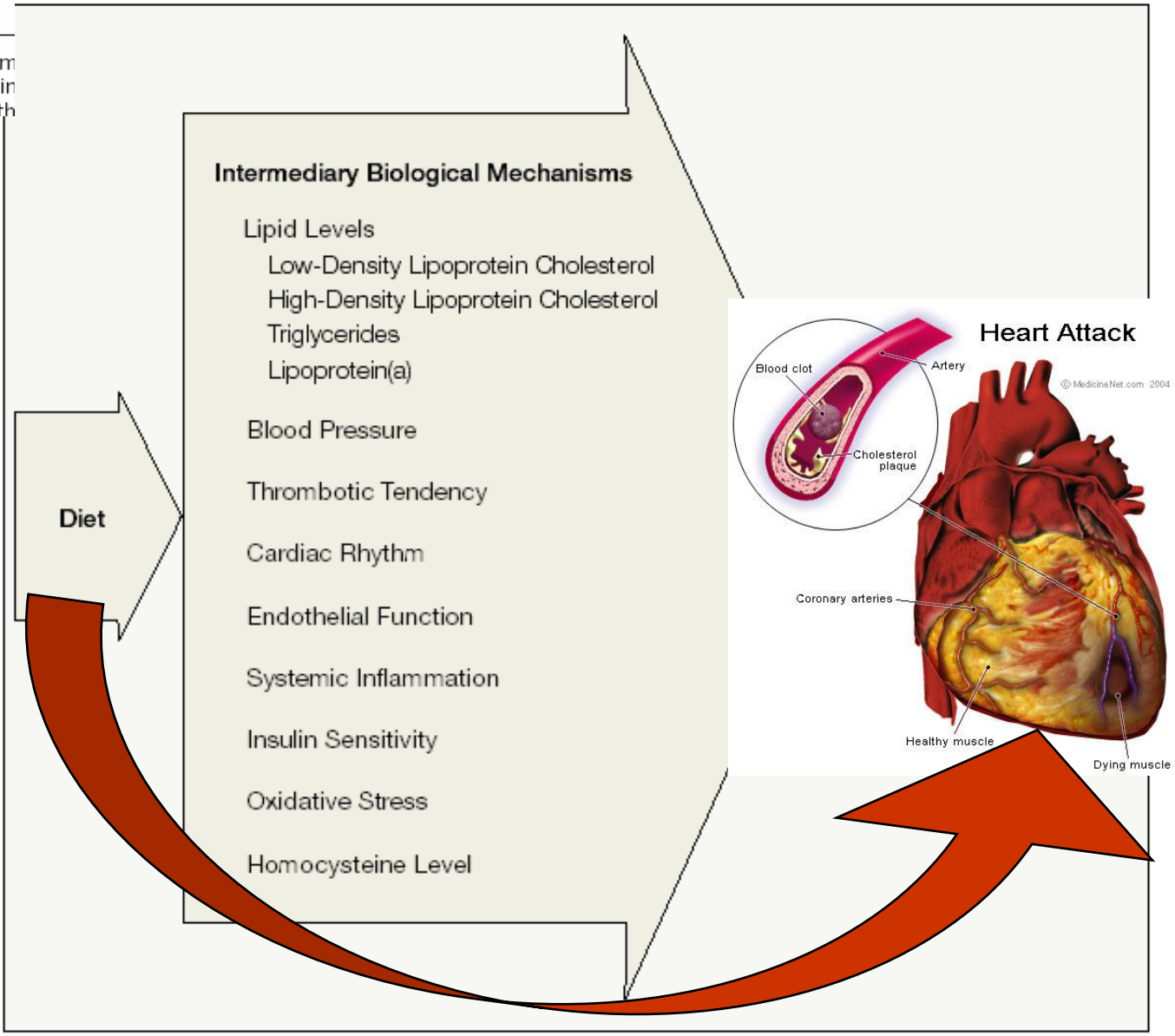
Ann Intern Med 2019;170:330-1.

Optimal Diets for Prevention of Coronary Heart Disease

Frank B. Hu, MD, PhD
Walter C. Willett, MD, DrPH

Context Coronary heart disease (CHD) rem
dustrialized countries and is rapidly becomin
Thus, identification of the dietary changes th

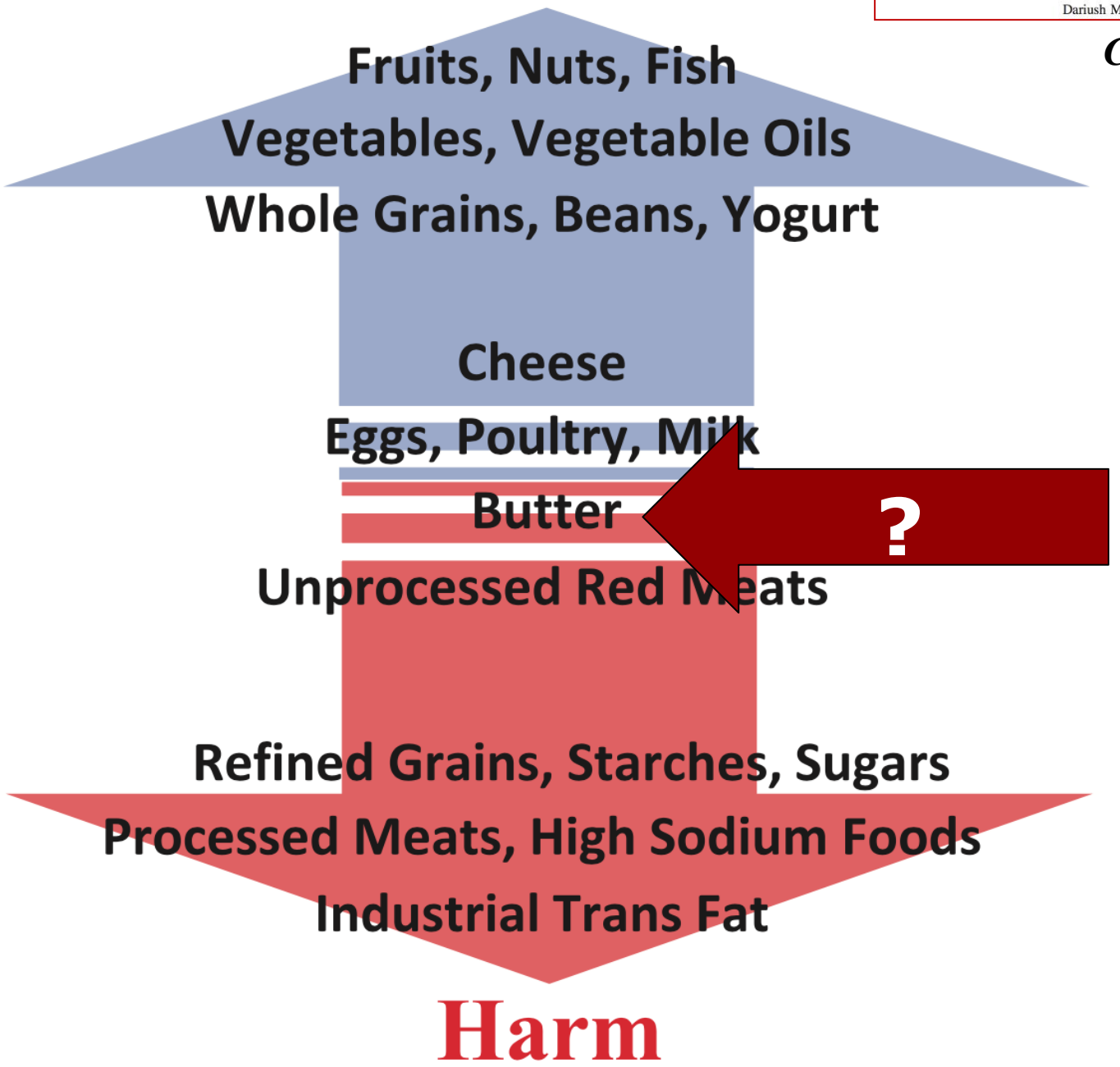
JAMA 2002;288:2569



Dietary and Policy Priorities for Cardiovascular Disease, Diabetes, and Obesity
A Comprehensive Review

Dariush Mozaffarian, MD, DrPH

Circulation 2016



- Fresh fruits (ALL) and berries
- Vegetables
- Salads
- Olive oil (extra-virgin*)
- Tree nuts (walnuts*)
- Whole grains
- Brown rice
- Fatty fish (salmon, tuna, sardines)
- Other fish
- Beans
- Yogurt
- Low-fat dairy
- Coffee
- Red wine (<3 men & <2 women)
- Water

- Industrial trans fats
- Red and processed meats
- Fast food: burgers, sausages
- Butter/margarine/cream
- Sugar-sweetened beverages
- Precooked foods
- Ultra-processed foods
- Salt-rich foods
- Added sugars, soda drinks
- Sweet desserts, cakes, biscuits
- Refined cereals (white bread)
- Potatoes, French fries
- Commercial bakery
- White rice
- White pasta



Understanding Nutritional Epidemiology and Its Role in Policy[1,2]

Adv Nutr. 2015;6:5-18.

Ambika Satija,[3,4] Edward Yu,[3] Walter C Willett,[3–5] and Frank B Hu[3–5]*

[3]Department of Nutrition and [4]Department of Epidemiology, Harvard School of Public Health, Boston, MA; and [5]Channing Division of Network Medicine, Brigham and Women's Hospital, Boston, MA

- Paradigmas farmacológicos no aplicables
- "Dicotomanía" no es el caso en nutrición
- El Ensayo Aleatorizado ***no*** es la panacea en nutrición: *compliance & blinding?*
- Buen control de confusión: información completa + *E-value*
- Efectos sinérgicos de patrón TOTAL: efecto acumulado de nutrientes
- Medidas repetidas de dieta TOTAL (PATRÓN) y variaciones a largo plazo
- Ajuste por ingesta energética total
- Validaciones y corrección de error de medida
- Cohortes→ en todo caso: mala clasificación no diferencial y atenuación

AGNO-GÉNESIS

By agnogenic practices we refer to methods of representing, communicating, and producing scientific research and evidence which work to create ignorance or doubt irrespective of the strength of the underlying evidence

- McGarity T, Wagner W. Bending science: how special interests corrupt public health. Harvard: Harvard University Press; 2010.

- Folks GF et al. Corporations' use and misuse of evidence to influence health policy: a case study of sugar-sweetened beverage taxation. Globalization & Health 2019;15:56.

VIEWPOINT

The Challenge of Reforming Nutritional Epidemiologic Research

JAMA Published online August 23, 2018

John P. A. Ioannidis, MD, DSc

RATE ADVANCEMENT PERIOD (RAP)

Assuming the meta-analyzed evidence from cohort studies represents life span–long causal associations, for a baseline life expectancy of 80 years, eating 12 hazelnuts daily (1 oz) would prolong life by 12 years (ie, 1 year per hazelnut),[1] drinking 3 cups of coffee daily would achieve a similar gain of 12 extra years,[2] and eating a single mandarin orange daily (80 g) would add 5 years of life.[1] Conversely, consuming 1 egg daily would reduce life expectancy by 6 years, and eating 2 slices of bacon (30 g) daily would shorten life by a decade, an effect worse than smoking.[1] Could these results possibly be true?

Authors often use causal language when reporting the findings from these studies (eg, "optimal consumption of risk-decreasing foods results in a 56% reduction of all-cause mortality").[1]

Gains (yr) = (1- RR_{low})*Life expect.?

(1-0.85)*80 = 12

$RR_{high} = 1/RR_{low}$

$RR_{high} = 1/0.85 = \mathbf{1.18}$

RAP(yr)= [(RR-1)/RR]*Life expect.?

[(**1.18**-1)/**1.18**]*80 = 12

Proponents of the status quo may maintain that the true associations are even larger than what are reported because of attenuation from nondifferential misclassification. Indeed, self-reported data have error,[6] but there is no guarantee it is nondifferential. Nevertheless, if error is nondifferential and estimated effects are attenuated, reported results become even more implausible: eating 12 hazelnuts daily would increase life expectancy by 20 to 30 years, not just 12 years.

VIEWPOINT

The Challenge of Reforming Nutritional Epidemiologic Research

John P. A. Ioannidis,

JAMA Published online August 23, 2018

RAP = ((RR-1)/RR)*Life expect.??

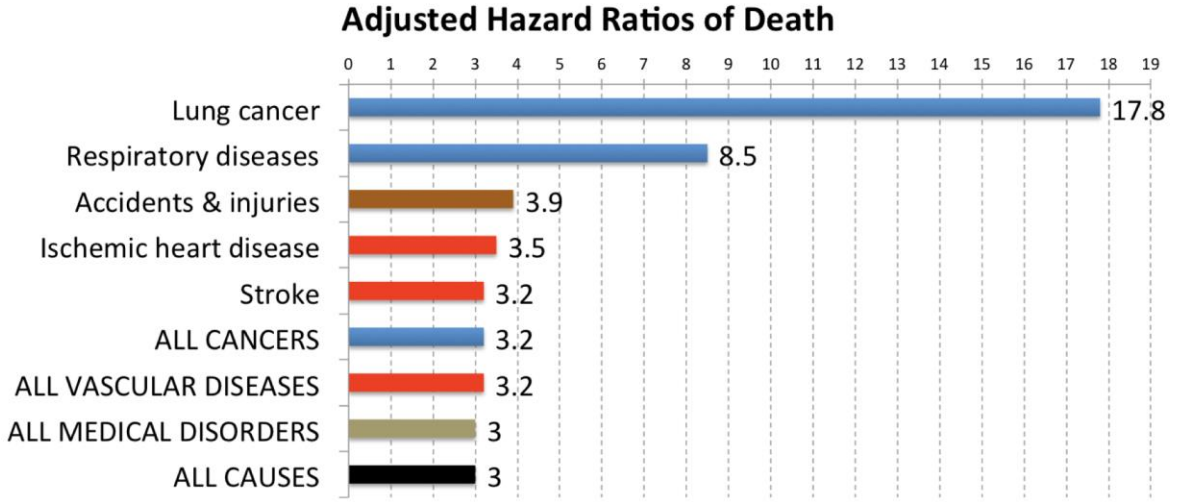
((**3**-1)/**3**)*80 = **53??**

SPECIAL ARTICLE

21st-Century Hazards of Smoking and Benefits of Cessation in the United States

Prabhat Jha, M.D., Chinthanie Ramasundarahettige, M.Sc., Victoria Landsman, Ph.D., Brian Rostron, Ph.D., Michael Thun, M.D., Robert N. Anderson, Ph.D., Tim McAfee, M.D., and Richard Peto, F.R.S.

N Engl J Med 2013;368:341-50



VIEWPOINT

The Challenge of Reforming Nutritional Epidemiologic Research

JAMA Published online August 23, 2018

John P. A. Ioannidis, MD, DSc

JAMA September 11, 2018 Volume 320, Number 10

Assuming the meta-analyzed evidence from cohort studies represents life span–long causal associations, for a baseline life expectancy of 80 years, eating 12 hazelnuts daily (1 oz) would prolong life by 12 years (ie, 1 year per hazelnut),[1] drinking 3 cups of coffee daily would achieve a similar gain of 12 extra years,[2] and a single mandarin orange daily (80 g) would add 5 of life.[1] Conversely, consuming 1 egg daily would reduce life expectancy by 6 years, and eating 2 slices of bacon (30 g) daily would shorten life by a decade, an effect worse than smoking.[1] Could these results possibly be true?

less, if error is nondifferential and estimated effects are attenuated, reported results become even more implausible: eating 12 hazelnuts daily would increase life expectancy by 3 to 4 years, not just 1.7 years.

WHO Director-General addresses health promotion conference



Dr Margaret Chan
Director-General of the World Health Organization

Opening address at the 8th Global Conference on Health Promotion
Helsinki, Finland
10 June 2013

Efforts to prevent noncommunicable diseases go against the business interests of powerful economic operators. In my view, this is one of the biggest challenges facing health promotion.

As the new publication makes clear, it is not just Big Tobacco anymore. Public health must also contend with Big Food, Big Soda, and Big Alcohol. All of these industries fear regulation, and protect themselves by using the same tactics.

Research has documented these tactics well. They include front groups, lobbies, promises of self-regulation, lawsuits, and industry-funded research that confuses the evidence and keeps the public in doubt.

Tactics also include gifts, grants, and contributions to worthy causes

AGNO-GÉNESIS

choice.

EPIDEMIOLOGIA NUTRICIONAL

EVIDENCIA OBSERVACIONAL

CEIPV

DISENSOS

PREDIMED Y PREDIMED-Plus

EPIDEMIOLOGIA NUTRICIONAL

EVIDENCIA OBSERVACIONAL

CEIPV

DISENSOS

PREDIMED Y PREDIMED-Plus

2019

Scientific Report of the 2015 Dietary Guidelines Advisory Committee (DGAC): Evidence Basis and Key Recommendations (Feb 25, 2015)

Best Diets

U.S. News evaluat
the best. Find whic
fitness goals.

Best Diets C

#1 Mediterrane

#2 DASH Diet

#3 The Flexitarian Diet

3 Beneficial dietary patterns

1. Healthy US-style pattern
2. Healthy Mediterranean-style pattern
3. Healthy Vegetarian pattern

The DGAC had enough descriptive information from existing research and data to model three dietary patterns and to examine their nutritional adequacy. These patterns are the Healthy U.S.-style Pattern, the Healthy Mediterranean-style Pattern, and the Healthy Vegetarian Pattern. These patterns include the components of a dietary pattern associated with health benefits.

The Committee`s examination of the association between dietary patterns and various health outcomes revealed remarkable consistency in the findings

The NEW ENGLAND JOURNAL of MEDICINE
ESTABLISHED IN 1812 JUNE 26, 2003 VOL. 348 NO. 26

9-item

Adherence to a Mediterranean Diet and Survival in a Greek Population

Antonia Trichopoulou, M.D., Tina Costacou, Ph.D., Christina Bamia, Ph.D., and Dimitrios Trichopoulos, M.D.

MedDietScore



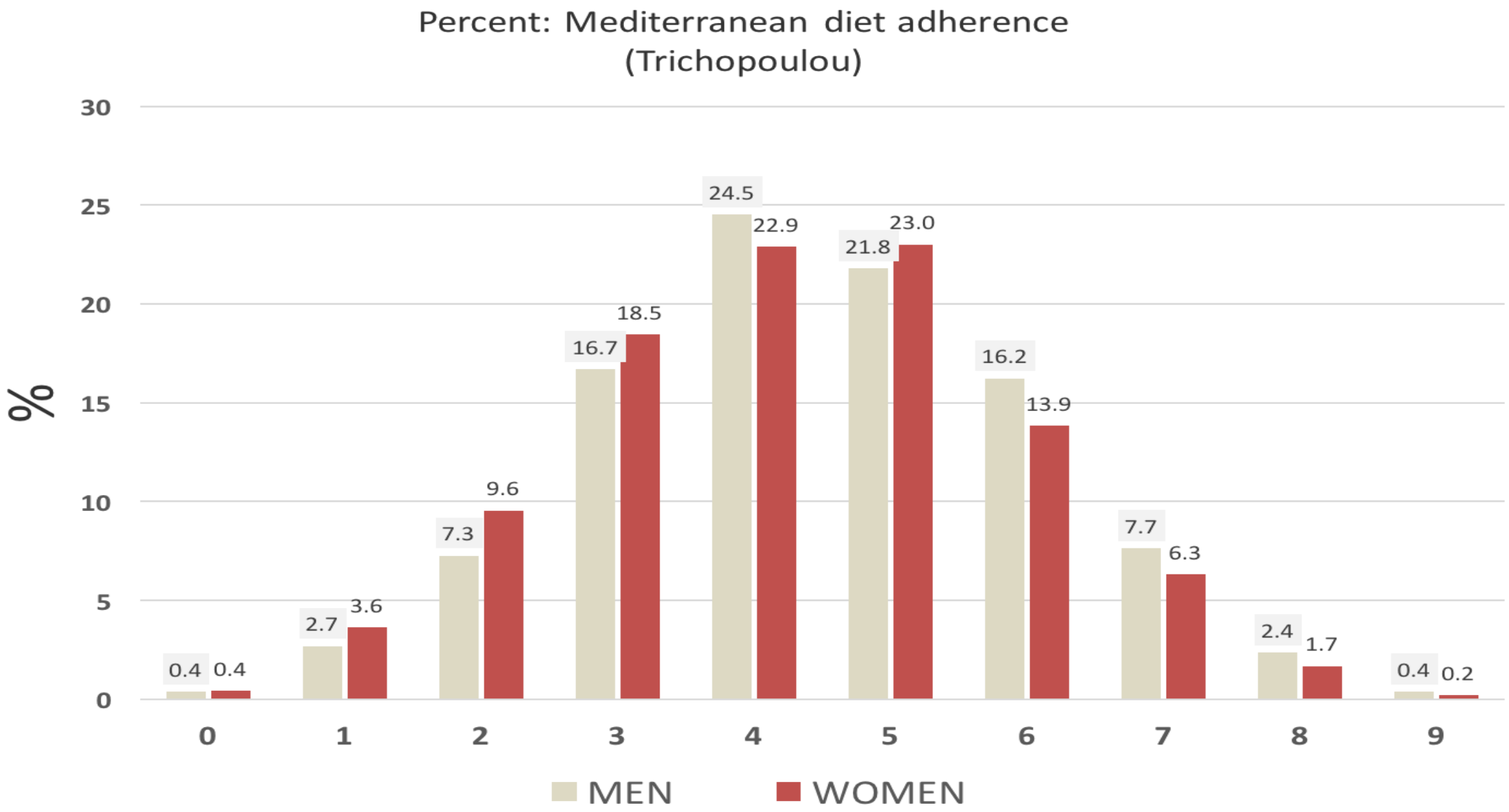
- **1 point if >= sex-specific Median**
  1. **MUFA/SFA ratio**
  2. **Fruits & nuts**
  3. **Vegetables**
  4. **Cereals**
  5. **Legumes**
  6. **Fish**
- **1 point if <= sex-specific Median**
  7. **Meat/meat products**
  8. **Dairy**
- **9. Alcohol: 1 point if**
  - **Men: between 10-50 g/d**
  - **Women: between 5-25 g/d**



Working report
Unpublished results

PREDIMED
Prevención con Dieta Mediterránea

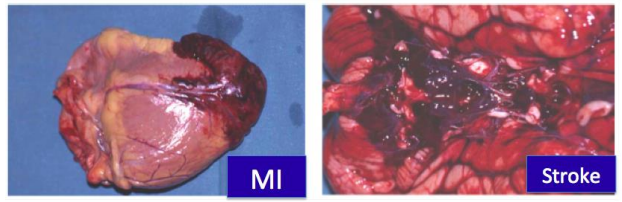
n=7447



Working report
Unpublished results

MedDiet & CVD
Trichopoulou's MDS (0-9)

Myocardial Infarction– Heart Attack
Cerebrovascular disease– Stroke
Cardiovascular deaths



PREDIMED
Prevención con Dieta Mediterránea

n=7447

Score	HR (95% CI)	P value
<=2	1 (ref.)	
3-5	0.79 (0.56-1.11)	0.18
6-7	0.54 (0.35-0.84)	0.006
8-9	0.19 (0.05-0.81)	0.03

For +2 points	0.82 (0.70-0.96)	0.01

Adjusted for age, center, intervention group & education

Review

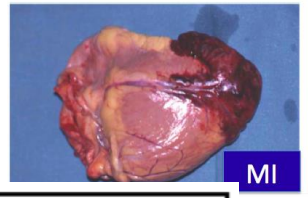
The Mediterranean Diet and Cardiovascular Health
A Critical Review

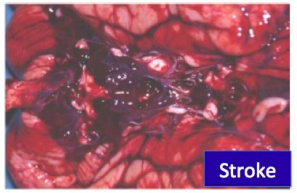
Miguel A. Martínez-González, Alfredo Gea, Miguel Ruiz-Canela

Circ Res. 2019;124:779-798. DOI: 10.1161/CIRCRESAHA.118.313348.)

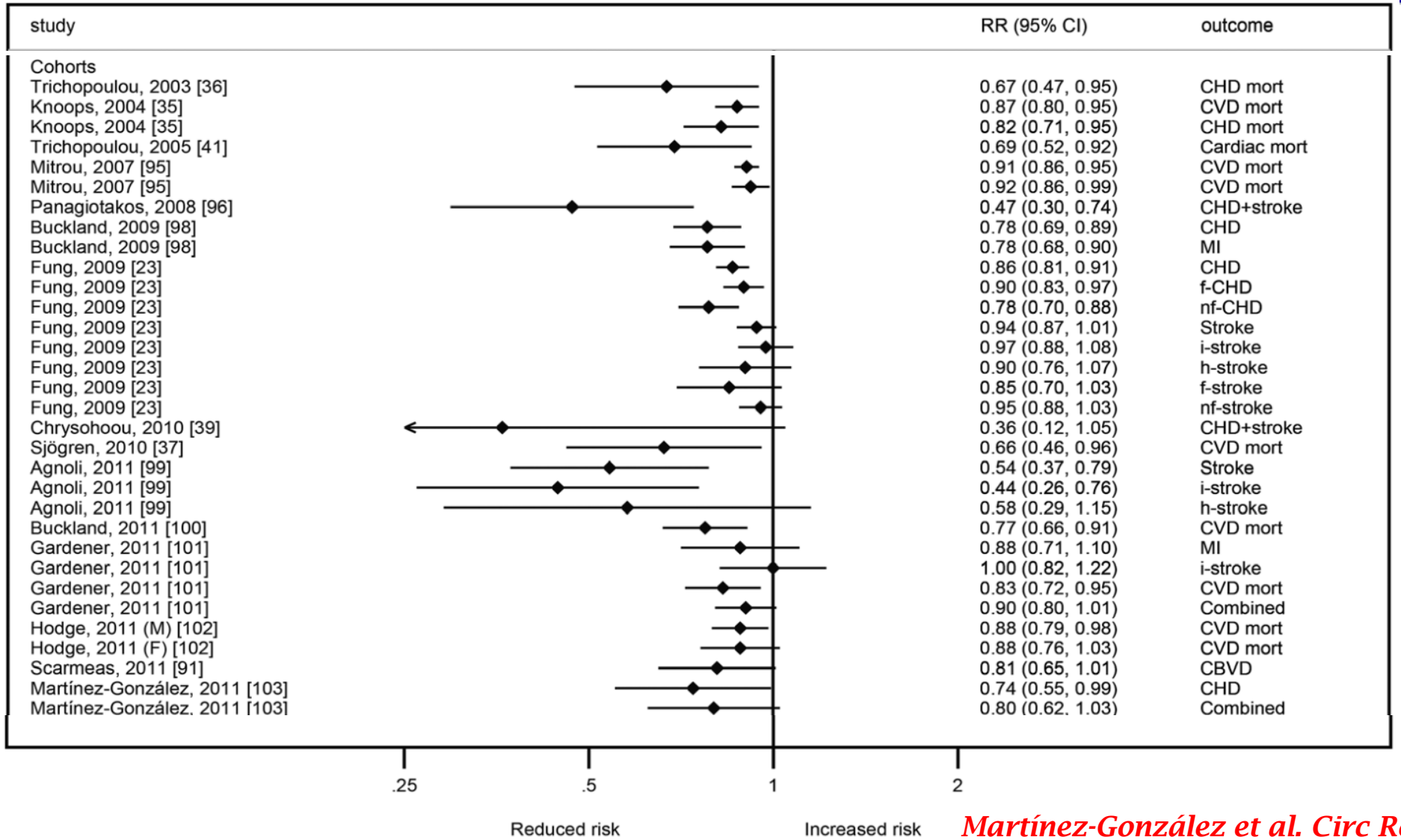
March-1st-2019

Myocardial Infarction– Heart Attack
Cerebrovascular disease– Stroke
Cardiovascular deaths

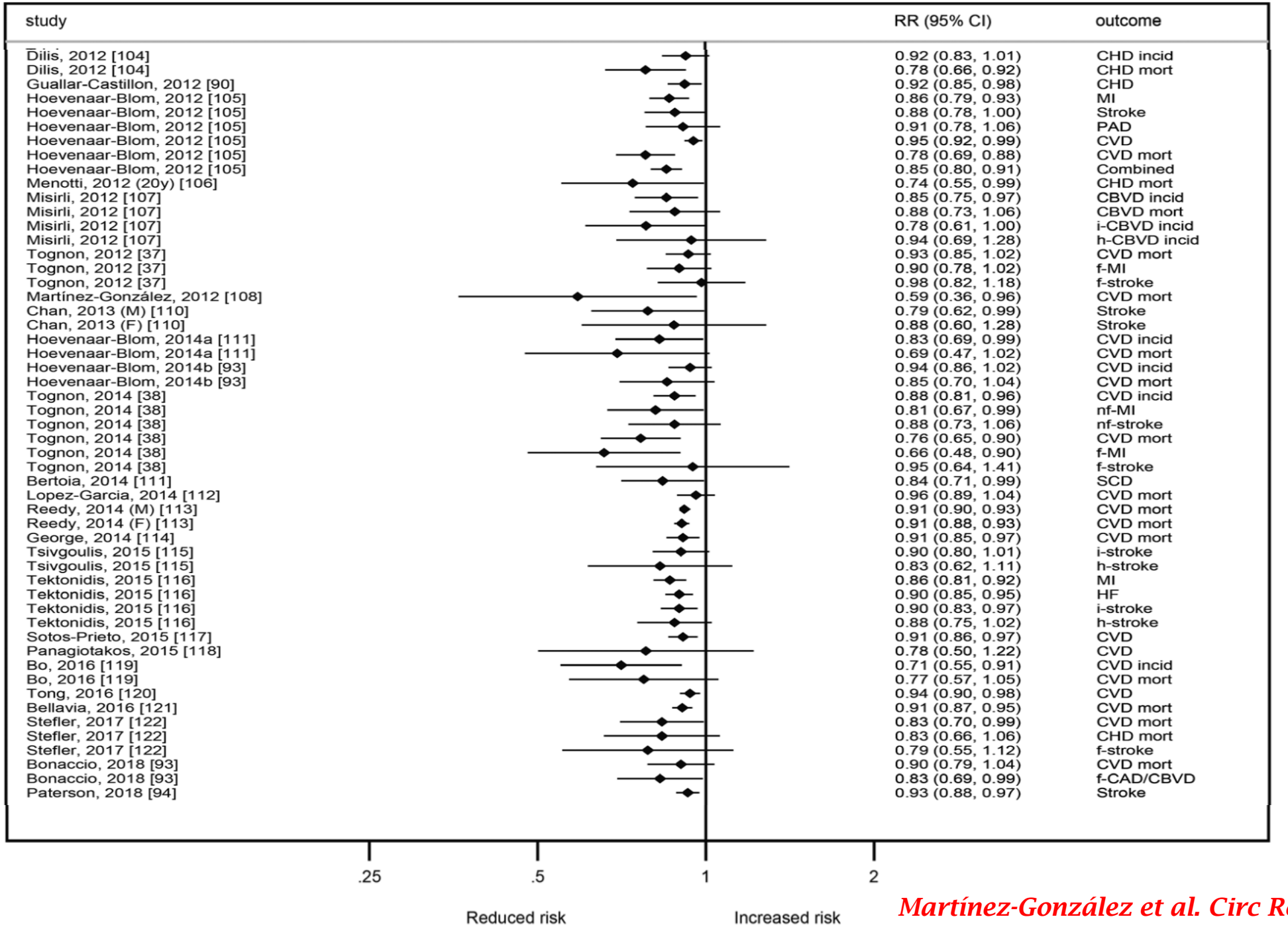




For +2 points / (range: 0 to 9)



Martínez-González et al. Circ Res 2019;124:779-98



Martínez-González et al. Circ Res 2019;124:779-98

The Mediterranean diet, an environmentally friendly option: evidence from the Seguimiento Universidad de Navarra (SUN) cohort

Ujué Fresán[1,*], Miguel-Angel Martínez-Gonzalez[1,2,3], Joan Sabaté[4] and Maira Bes-Rastrollo[1,2,3]

PHN PUBLIC HEALTH NUTRITION

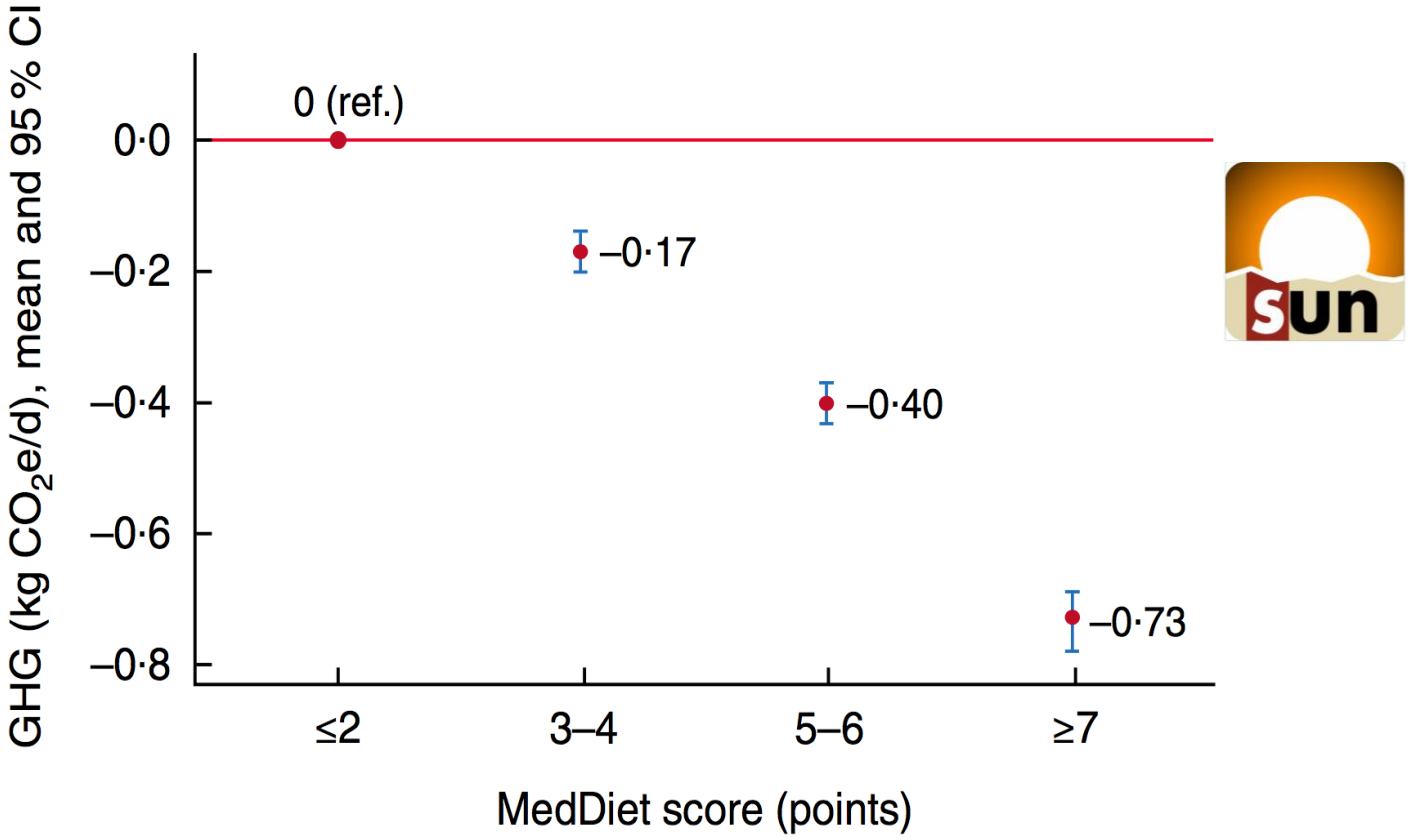
Public Health Nutr, 2018

mbes@unav.es

GreenHouse Gas (GHG) emissions

N = 20 363 participants

MedDiet associated with lower land use (−0·71 (95 % CI −0·76, −0·66) m^2/d),
water consumption (−58·88 (95 % CI −90·12, −27·64) litres/d),
energy consumption (−0·86 (95% CI −1·01, −0·70) MJ/d) and
GHG emission (−0·73 (95 % CI −0·78, −0·69) kg CO_2 e/d).



Overall diet quality to prevent CVD burden

- Studying overall dietary patterns provides valuable information on CVD prevention

The **Alternative Healthy Eating Index-2010** (AHEI) score:

AHEI score associated with 32% lower risk of CHD

Chiuve et al., 2012 Journal of Nutrition

The Alternative **Mediterranean** diet (AMED) score

2-point increase in Mediterranean diet associated with 13% lower risk of CVD events

Martinez-Gonzalez MA et al., 2014. Curr Opin Lipidol .

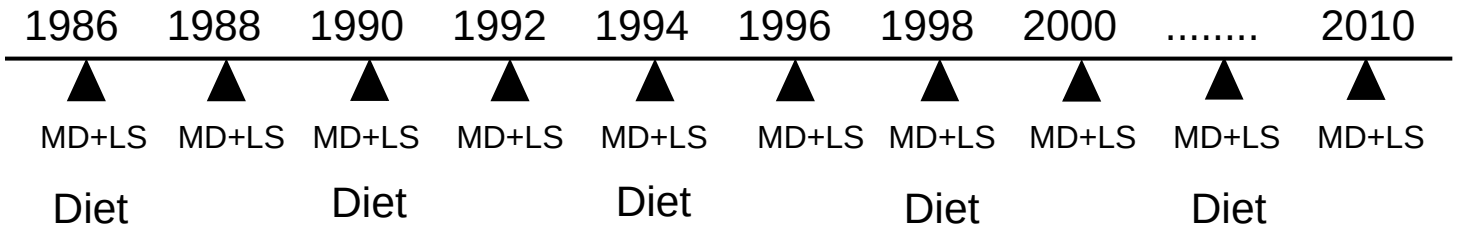
The Dietary Approaches to Stop Hypertension (**DASH**) score

The DASH-style diet associated with 9-22% lower risk of CVD

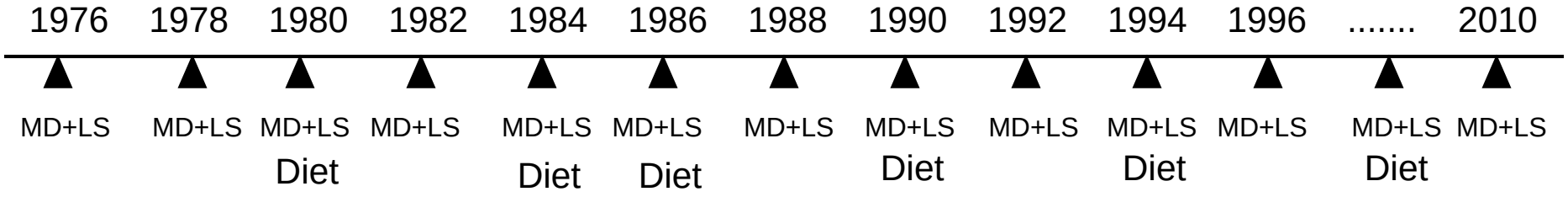
Struijk EA, et al.,2014. . International Journal of Cardiology
Itzgerald Kcet al., 2012. J Thromb Haemost 2012;10:189-98.
Ready et al., 2014. J Nutrition

Changes in diet over time and CVD risk

Health Professionals Follow-up Study (51,529 men, aged 40 to 75 years)



Nurses' Health Study (121,701 women, aged 30 to 55 years)



Repeated measurements over time:

- **Every Two Years: Medical records and lifestyle (MD+LS)**
- **Every Four Years: Detailed dietary habits (FFQ)**

To assess the association between **4-year changes in three diet quality** scores (AHEI, AMED, and DASH) and the **subsequent risk of CVD** (in the subsequent 4-year follow up)

Short term CVD risk

Hazard Ratios (95% Cis) for incidence CVD based on updated 4-year **changes** in diet quality score

	Q1 (Decreasing)	Q2	Q3 (Stable)	Q4	Q5 (Improving)	P trend	HR equivalent to 20% of increase
AHEI							
Model 2	1.01 (0.94-1.07)	0.97 (0.91-1.04)	1 [Ref]	0.93 (0.87-1.03)	**0.92 (0.87-0.99)**	0.003	0.91 (0.86-0.97)
AMED							
Model 2	1.01 (0.95- 1.07)	0.99 (0.86-1.14)	1 [Ref]	0.96 (0.90-1.02)	**0.93 (0.85-1.02)**	0.01	0.97 (0.94-0.99)
DASH							
Model 2	1.02 (0.96-1.09)	0.95 (0.89-1.02)	1 [Ref]	0.96 (0.90-1.02)	**0.93 (0.87-0.99)**	0.003	0.94 (0.90-0.98)

8%

7%

7%

9%

3%

6%

Individuals with initially low diet quality scores could still reduce their CVD risk by improving their diet quality

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association.

Changes in Diet Quality Scores and Risk of Cardiovascular Disease Among US Men and Women

Mercedes Sotos-Prieto, Shilpa N. Bhupathiraju, Josiemer Mattei, Teresa T. Fung, Yanping Li, An Pan, Walter C. Willett, Eric B. Rimm and Frank B. Hu

What is the association with overall and specific-cause mortality?

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Association of Changes in Diet Quality with Total and Cause-Specific Mortality

Mercedes Sotos-Prieto, Ph.D., Shilpa N. Bhupathiraju, Ph.D., Josiemer Mattei, Ph.D., M.P.H., Teresa T. Fung, Sc.D., Yanping Li, Ph.D., An Pan, Ph.D., Walter C. Willett, M.D., Dr.P.H., Eric B. Rimm, Sc.D., and Frank B. Hu, M.D., Ph.D.

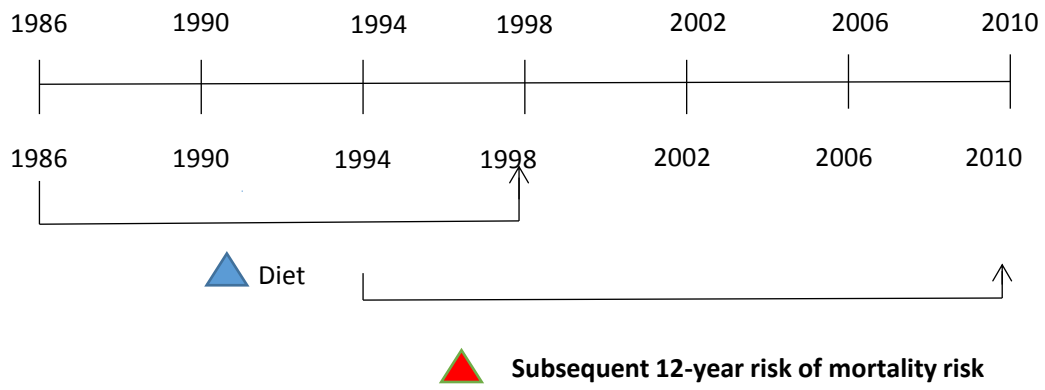
N Engl J Med. 2017 Jul 13;377(2):143-153.

The Alternative Healthy Eating Index-2010 (AHEI) score

The Alternative Mediterranean diet (AMED)

The Dietary Approach to Stop Hypertension (DASH) score

12 y change



Results: 12-years change in diet and cause specific mortality

12-year **changes** (1986-1998) in diet quality scores and total mortality, CVD mortality and cancer mortality per 20-percentile of increase in each score (calculated from the median value of each quintile)

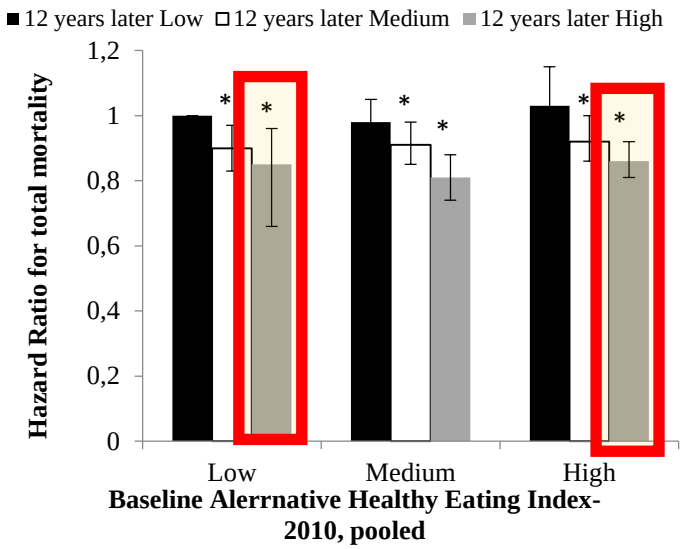
	Overall mortality	CVD mortality	Cancer mortality
AHEI (range 0-110)			
MV model	0.83 (0.78, 0.88)	0.85 (0.76, 0.96)	0.94 (0.85, 1.04)
AMED (range 0-9)			
MV model	0.92 (0.89, 0.95)	0.93 (0.88, 0.99)	0.98 (0.93, 1.03)
DASH (range 8-40)			
MV model	0.90 (0.86, 0.94)	0.96 (0.88, 1.05)	0.91 (0.84, 0.98)

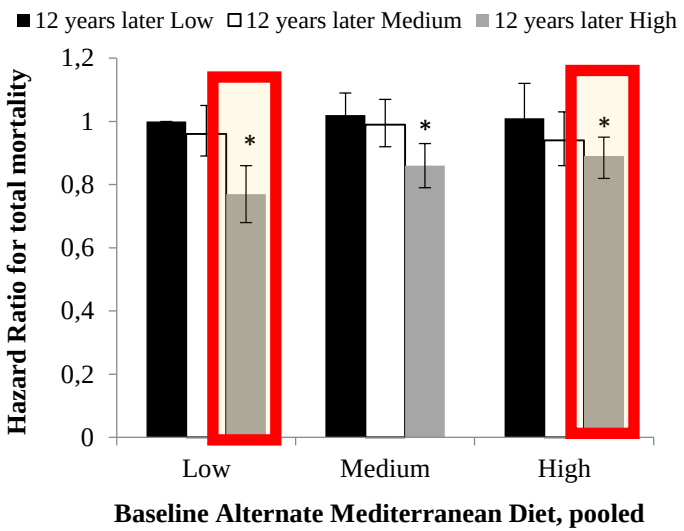
A 20% increase was associated:

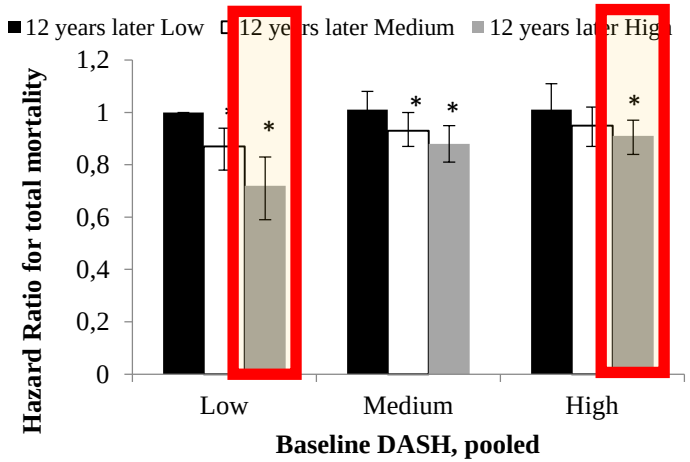
- 8-17% total mortality
- 7-15% CVD mortality

Sotos-Prieto M et al. N Engl J Med. 2017 Jul 13;377(2):143-153.

Joint associations of baseline diet and changes in diet scores 12 years later





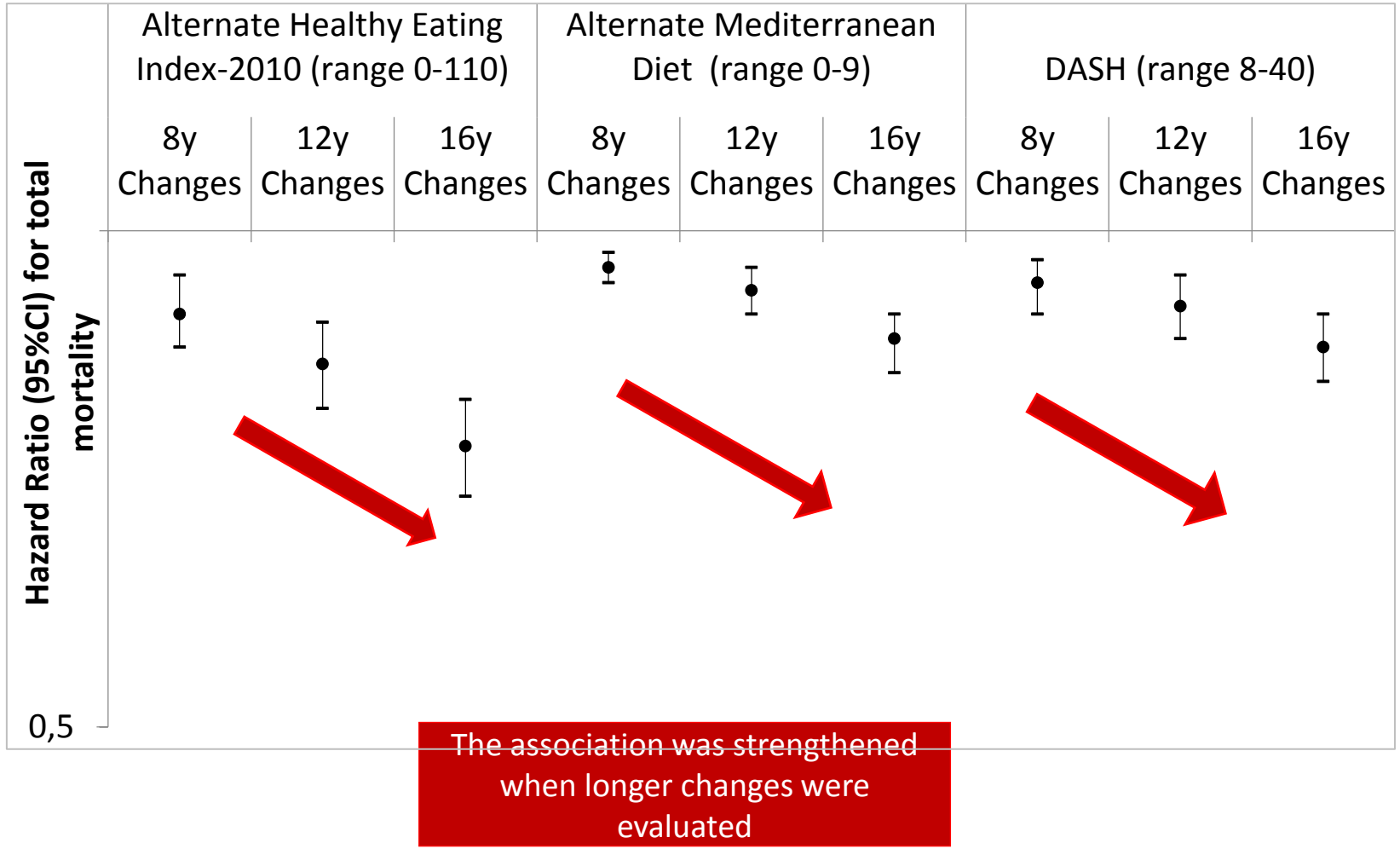


Maintaining a higher adherence:
9-14% lower **total mortality**

Changes from low to higher adherence:
15-28% lower **total mortality**

Sotos-Prieto M et al. N Engl J Med. 2017 Jul 13;377(2):143-153.

Shorter- and longer-term changes in diet quality



Sotos-Prieto M et al. N Engl J Med. 2017 Jul 13;377(2):143-153.

EPIDEMIOLOGIA NUTRICIONAL

EVIDENCIA OBSERVACIONAL

CEIPV

DISENSOS

PREDIMED Y PREDIMED-Plus

EPIDEMIOLOGIA NUTRICIONAL

EVIDENCIA OBSERVACIONAL

CEIPV

DISENSOS

PREDIMED Y PREDIMED-Plus

DISENSOS

- Carnes rojas y procesadas
- Grasa saturada
- Huevo
- Pan blanco-patatas-pasta-arroz
- Sal

AGNO-GÉNESIS

EL MUNDO España Opinión Economía Internacional Deportes LOC Más

‹ Ciencia y Salud | Salud

1 Octubre 2019

SALUD

Críticas al polémico estudio que da vía libre al consumo de carne roja y procesada



FORKS

True Health Initiative Respectfully Disagrees

The Annals of Internal Medicine has just published a series of systematic reviews and meta-analyses. Despite many of the reviews' data showing negative health effects of consuming red and processed meat, such as increased all-cause mortality, cardiovascular disease, cancer and diabetes, the authors are calling for alternative 'guidelines' and advising people to continue consuming red and processed meat at current levels. True Health Initiative (THI) urges scientists, nutritionists and consumers to look deeper.



Los epidemiólogos españoles valoramos el esforzado ejercicio académico de un reducido grupo de investigadores, publicado el 30 de septiembre de 2019 en Annals of Internal Medicine, en que recomiendan que cada persona mantenga su consumo habitual de carne roja y procesada. **Sin embargo, antes de hacer esta recomendación estos investigadores deberían haber**:

1. **Considerado todos los estudios disponibles:** deberían haber usado también estudios de los mecanismos biológicos de la carne sobre la salud, del efecto nocivo de la carne roja y procesada sobre los factores de riesgo cardiovascular y, sobre todo, haber puesto el foco en los numerosos estudios epidemiológicos bien hechos que demuestran (como reconoce la inmensa mayoría de los científicos del mundo) que el consumo excesivo de carnes rojas y procesadas aumenta el riesgo de obesidad, de muchas enfermedades crónicas y de mortalidad total. Curiosamente, a pesar de la actual pandemia de obesidad, olvidan este problema
2. **Adoptado una perspectiva de salud pública:** a partir de los propios datos de estos artículos de Ann Intern Med, hemos estimado que con solo reducir en 3 las raciones de carnes procesadas a la semana se evitarían al menos 5.500 muertes anuales en la población española de 40-80 años. Por tanto, el beneficio de reducir el consumo de carne procesada es enorme (más del doble que evitar todas las muertes por accidente de tráfico).

TIME: Eat butter. Scientists labeled fat the enemy. Why they were wrong.

June 12 2014 by Dr. Andreas Eenfeldt, MD in Saturated fat, The food revolution

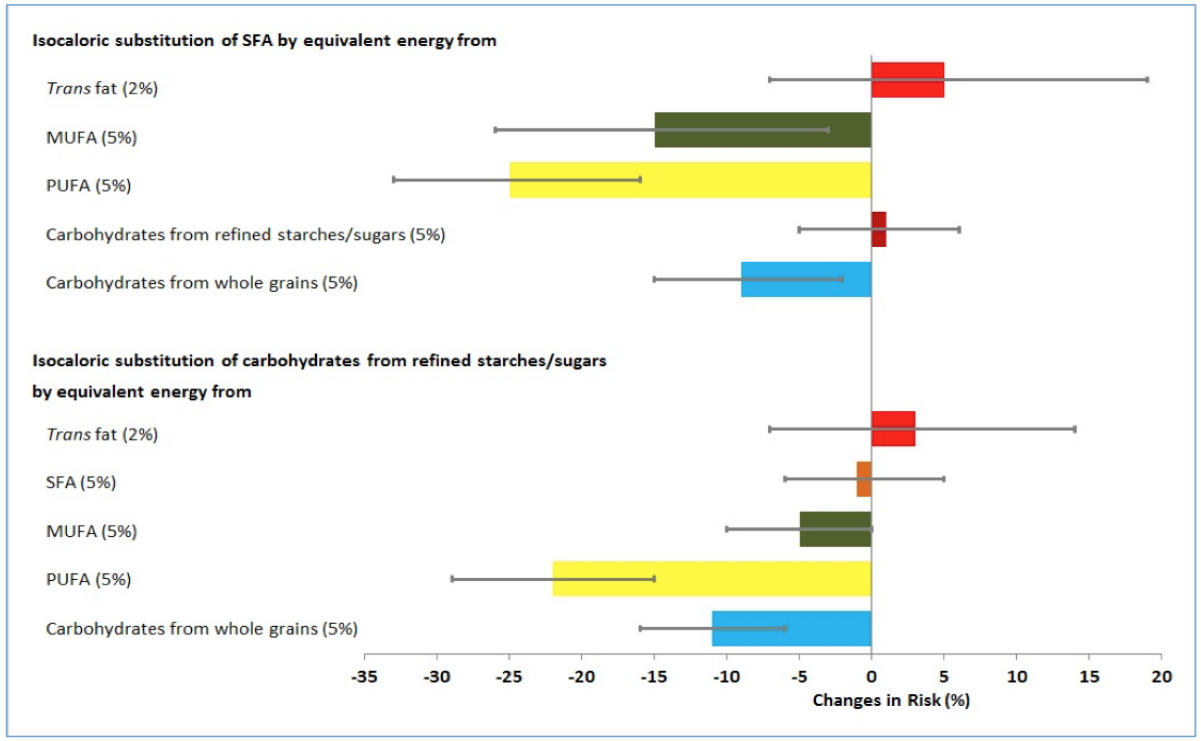


JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY
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VOL. 66, NO. 14, 2015
ISSN 0735-1097/$36.00
http://dx.doi.org/10.1016/j.jacc.2015.07.055

Saturated Fats Compared With Unsaturated Fats and Sources of Carbohydrates in Relation to Risk of Coronary Heart Disease

A Prospective Cohort Study

Yanping Li, PhD,* Adela Hruby, PhD, MPH,* Adam M. Bernstein, MD, ScD,† Sylvia H. Ley, PhD,* Dong D. Wang, MD,* Stephanie E. Chiuve, ScD,*‡ Laura Sampson, RD,* Kathryn M. Rexrode, MD, MPH,† Eric B. Rimm, ScD,*§‖ Walter C. Willett, MD, DrPH,*§‖ Frank B. Hu, MD, PhD*§‖

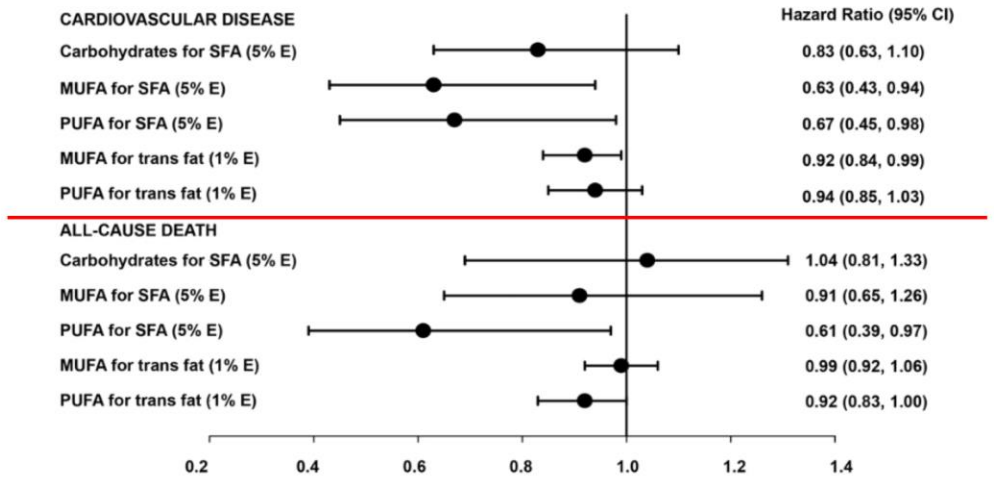


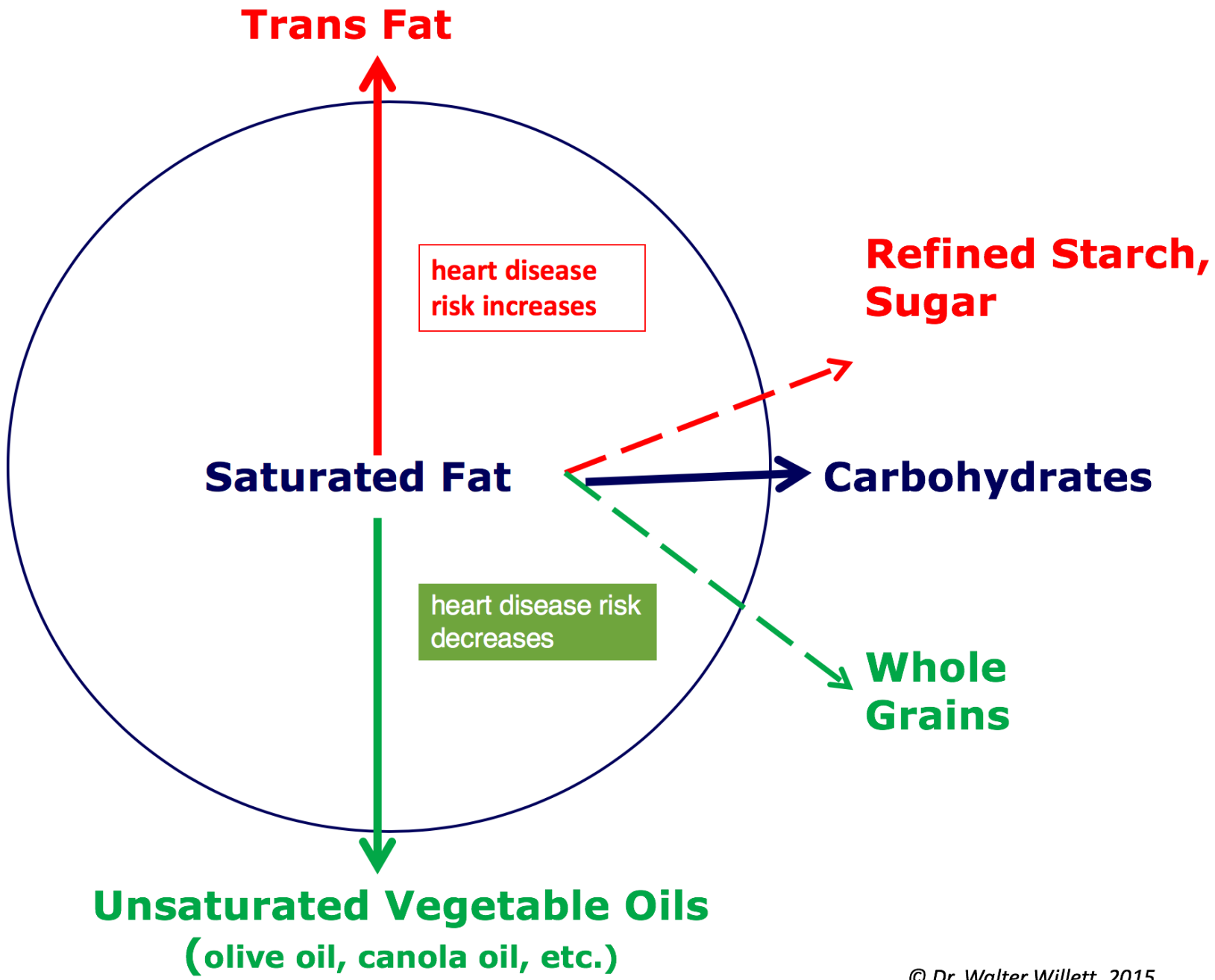
¿Comparado con quién?

Dietary fat intake and risk of cardiovascular disease and all-cause mortality in a population at high risk of cardiovascular disease[1]

Marta Guasch-Ferré,[2,3] Nancy Babio,[2,3] Miguel A Martínez-González,[3,4] Dolores Corella,[3,5] Emilio Ros,[3,6] Sandra Martín-Peláez,[3,8] Ramon Estruch,[3,7] Fernando Arós,[3,9] Enrique Gómez-Gracia,[3,10] Miquel Fiol,[3,11] José M Santos-Lozano,[3,12] Lluís Serra-Majem,[3,13] Mònica Bulló,[2,3] Estefanía Toledo,[3,4] Rocío Barragán,[3,5] Montserrat Fitó,[3,6] Alfredo Gea,[3,4] and Jordi Salas-Salvadó[2,3]* for the PREDIMED Study Investigators

Am J Clin Nutr 2015;102:1563–73.





© Dr. Walter Willett, 2015

JAMA. 2019 Mar 19;321(11):1081-1095. doi: 10.1001/jama.2019.1572.

Associations of Dietary Cholesterol or Egg Consumption With Incident Cardiovascular Disease and Mortality.

Zhong VW[1], Van Horn L[1], Cornelis MC[1], Wilkins JT[1], Ning H[1], Carnethon MR[1], Greenland P[1], Mentz RJ[2,3], Tucker KL[4], Zhao L[1], Norwood AF[5], Lloyd-Jones DM[1], Allen NB[1].

Each additional half an **egg** consumed per day was significantly associated with higher risk of incident CVD (adjusted HR, **1.06** [95% CI, **1.03-1.10**];

Egg consumption and risk of coronary heart disease and stroke: dose-response meta-analysis of prospective cohort studies

OPEN ACCESS

Ying Rong *doctoral student*[1 2], Li Chen *research fellow*[1 2], Tingting Zhu *research fellow*[1 2], Yadong Song *research fellow*[1 2], Miao Yu *research fellow*[1 2], Zhilei Shan *research fellow*[1 2], Amanda Sands *doctoral student*[3], Frank B Hu *professor*[3], Liegang Liu *professor*[1 2]

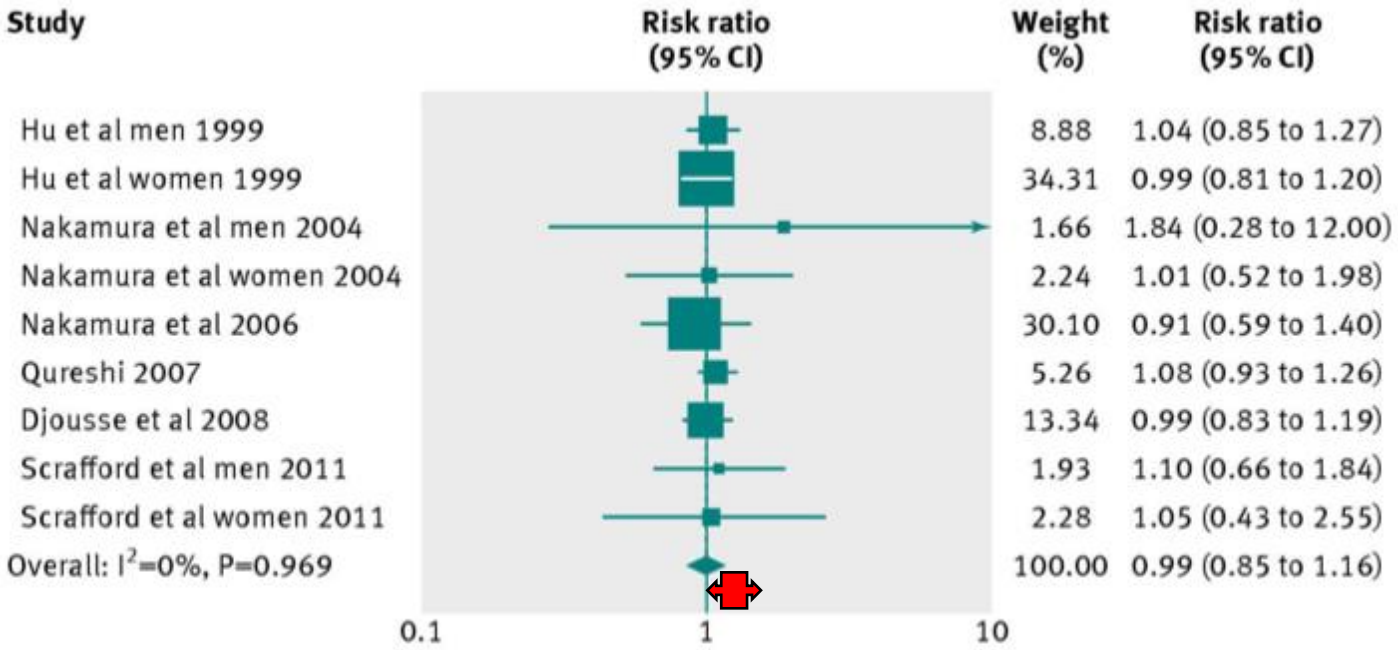
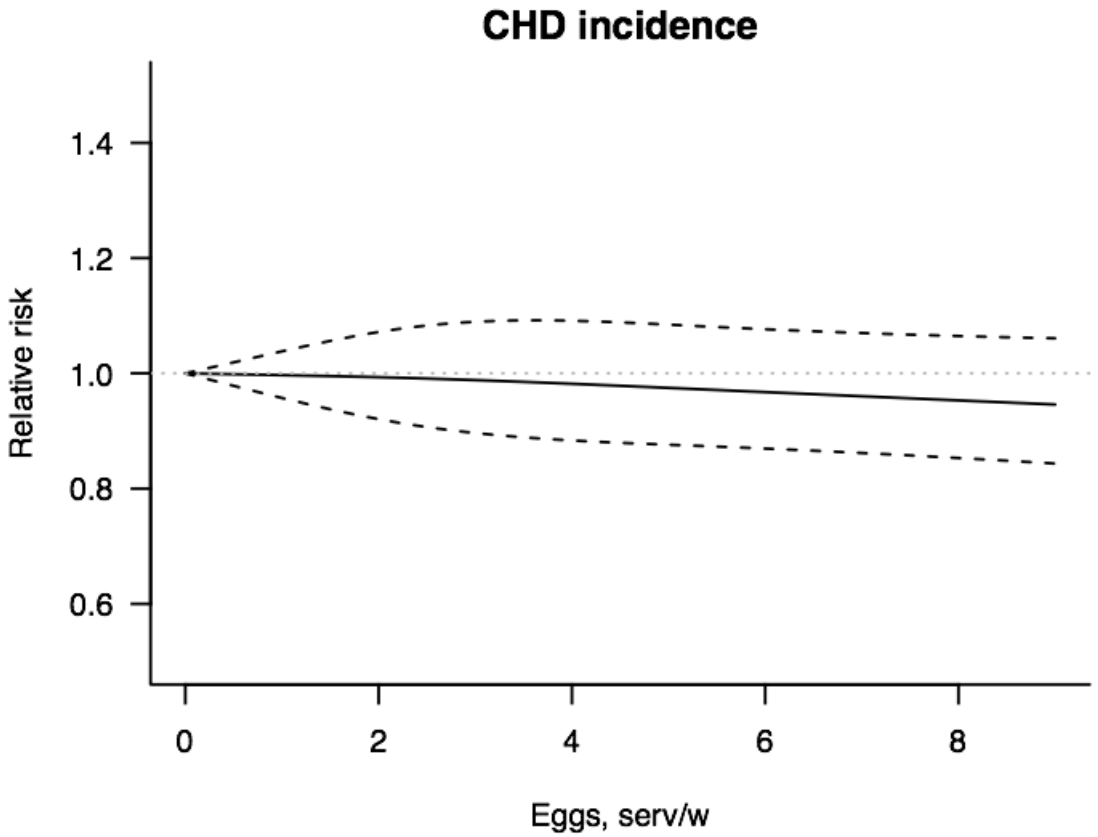


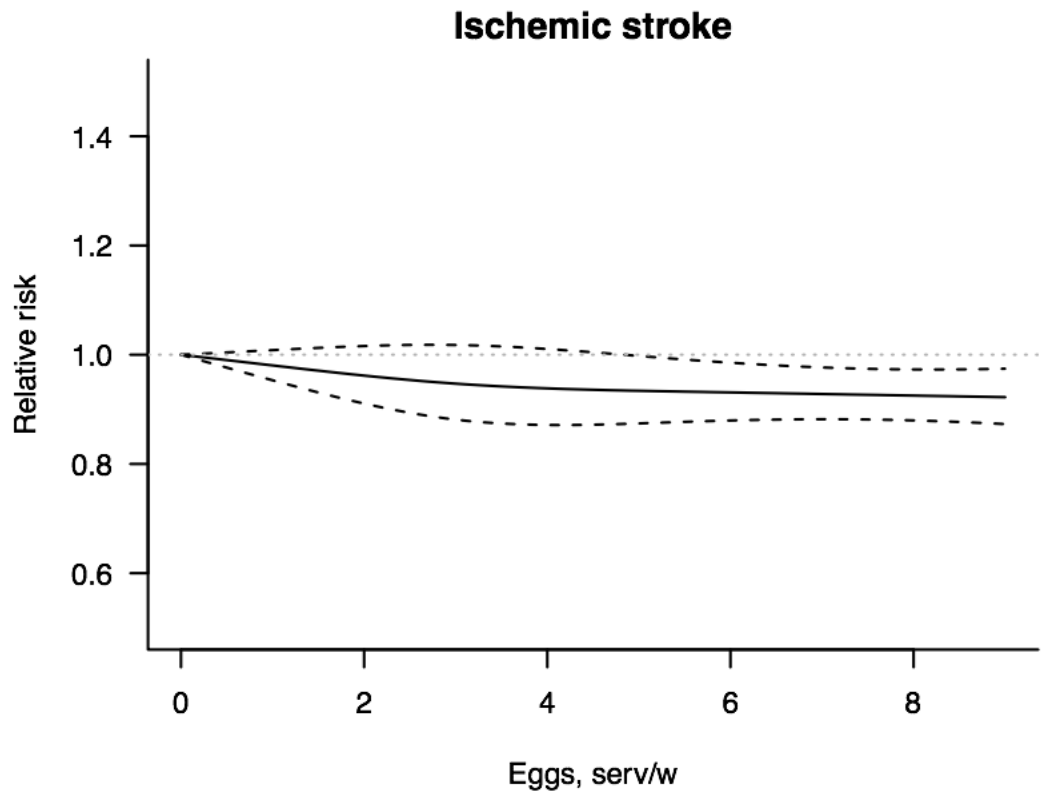
Fig 3 Forest plot of egg consumption and risk of coronary heart disease

Godos J, Micek A, Brzostek T, Toledo E, Iacoviello L, Astrup A, Franco OH, Galvano F, Martinez-Gonzalez MA, Grosso G.
Egg consumption and cardiovascular risk: a dose-response meta-analysis of prospective cohort studies (submitted)

30 cohort studies

N=983,493 for CHD
N= 284,240 for stroke
N=108,563 for heart failure
N=601,226 for CVD incidence/mortality






Pirámide de la Alimentación Saludable
Suplementos nutricionales
Vitamina D, folatos...
Opción individualizada
BEBIDAS FERMENTADAS
CONSUMO OPCIONAL, MODERADO
Y RESPONSABLE EN ADULTOS
CONSUMO OPCIONAL,
OCASIONAL Y MODERADO
2-3 AL DÍA
LECHE
CONSUMO VARIADO DIARIO
1-3 AL DÍA (ALTERNAR)
2-3 AL DÍA
VERDURAS +
FRUTAS
+ 5 RACIONES
3-4 AL DÍA
GRUPOS DE CONSUMO
EN CADA COMIDA
INTEGRAL
PASTA
ARROZ
INTEGRAL
HARINA
SEGÚN GRADO
DE ACTIVIDAD
FÍSICA
MANTENER
ESTILOS DE VIDA
SALUDABLES
Actividad
física diaria
60 min.
Equilibrio
emocional
Balance
Energético
Técnicas
culinarias
saludables
AGUA: 4-6 vasos al día*
(*) Ingesta de líquidos según la Pirámide
de la Hidratación Saludable SENC.

Association between a dietary carbohydrate index and cardiovascular disease in the SUN (Seguimiento Universidad de Navarra) Project

I. Zazpe [a,b,c,d], S. Santiago [c,d], A. Gea [a,b,d], M. Ruiz-Canela [a,b,d], S. Carlos [a,d], M. Bes-Rastrollo [a,b,d], M.A. Martínez-González [a,b,d,*]

Nutr Metab Cardiovasc Dis. 2016;26:1048-1056

n=17 424 participants (mean age: 38.9, 61% women)
Median follow-up: 10.1 years

Carbohydrate Quality Index

CQI

- +Fibra
- +Integrales
- –*Indice glicémico*
- –*Líquidos*

Table 1 Criteria used to calculate carbohydrate quality.

Components of carbohydrate quality index	Index range (points)[a]	Criteria for minimum index	Criteria for maximum index
Dietary fiber intake (g/d)	1–5	Minimum dietary fiber intake (first quintile)	Maximum dietary fiber intake (fifth quintile)
Glycemic index	1–5	Maximum glycemic index (fifth quintile)	Minimum glycemic index (first quintile)
Ratio of whole-grain/total-grain carbohydrates	1–5	Minimum value of this ratio (first quintile)	Maximum value of this ratio (fifth quintile)
Ratio solid carbohydrates/(solid carbohydrates + liquid carbohydrates)	1–5	Minimum value of this ratio (first quintile)	Maximum value of this ratio (fifth quintile)
Total index (range)	4–20		

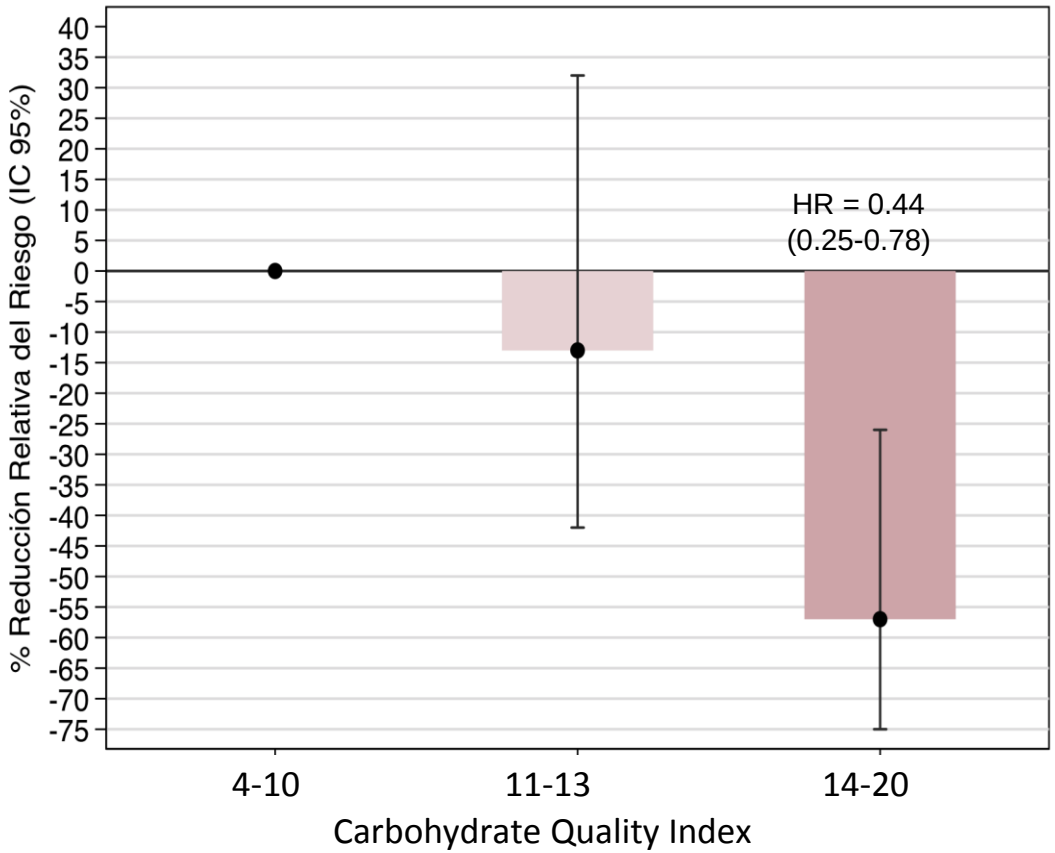
[a] Proportional dietary indices were computed for intakes ranging between the maximum and minimum criteria.

Association between a dietary carbohydrate index and cardiovascular disease in the SUN (Seguimiento Universidad de Navarra) Project

I. Zazpe [a,b,c,d], S. Santiago [c,d], A. Gea [a,b,d], M. Ruiz-Canela [a,b,d], S. Carlos [a,d], M. Bes-Rastrollo [a,b,d], M.A. Martínez-González [a,b,d,*]

Nutr Metab Cardiovasc Dis. 2016;26:1048-1056

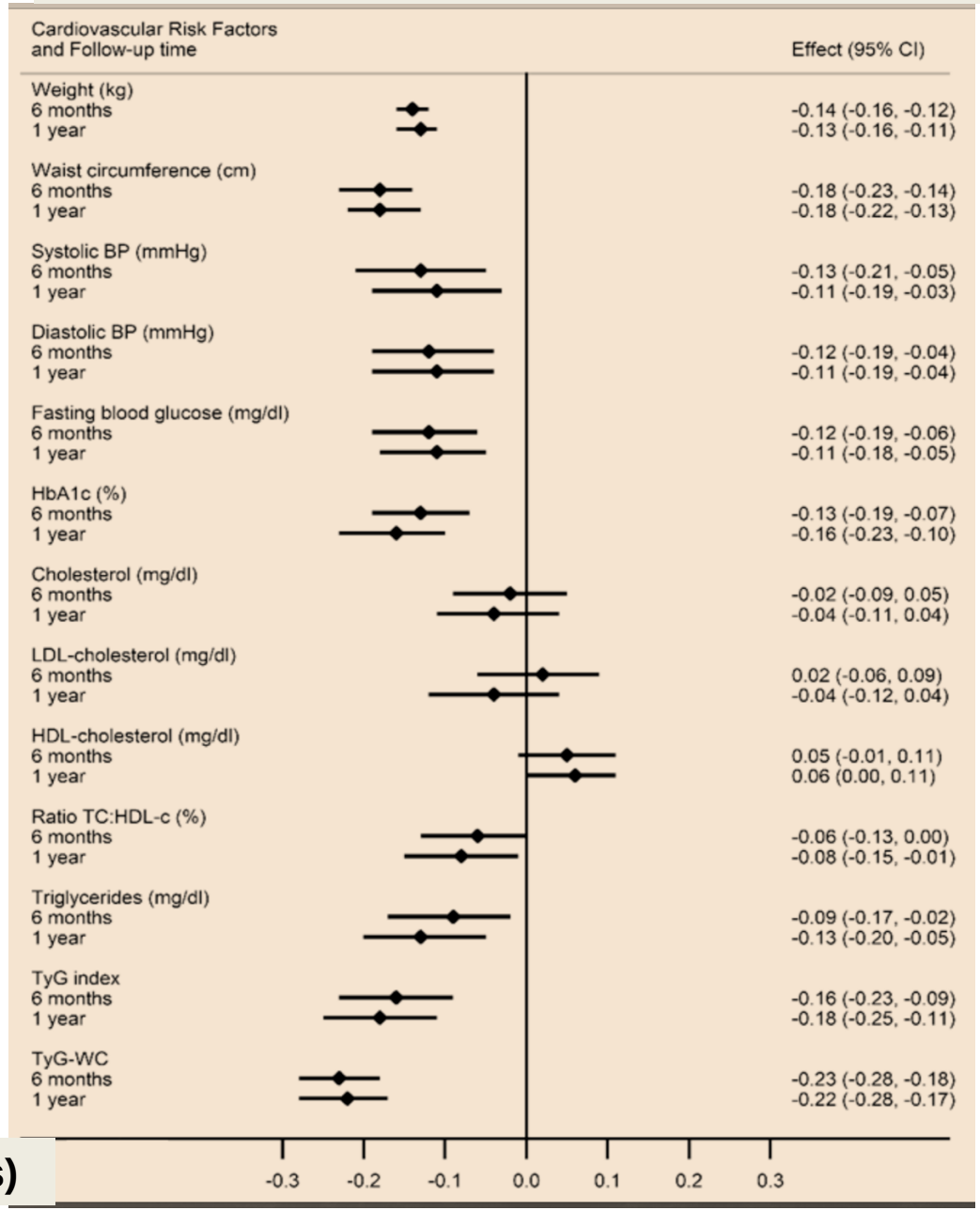
CQI



Adjusted for age at recruitment, sex, total energy intake, BMI, smoking habit, leisure-time physical activity, sitting hours/week, special diet at the baseline, weight gain in the 5 years previous to entering the cohort, educational level, marital status, adherence to Mediterranean diet, family history of CVD, prevalent or previous angina pectoris or revascularization procedures, prevalent diabetes, prevalent hypertension, prevalent hypercholesterolemia, prevalent hypertriglyceridemia, prevalent depression, habit of snacking between meals, protein intake, total fat intake, MUFA intake, PUFA intake, SFA intake,and trans fat intake.

Fernández-Lázaro CI, for the PREDIMED-Plus group

Changes in CQI (Q5 vs. Q1) and concurrent RF changes

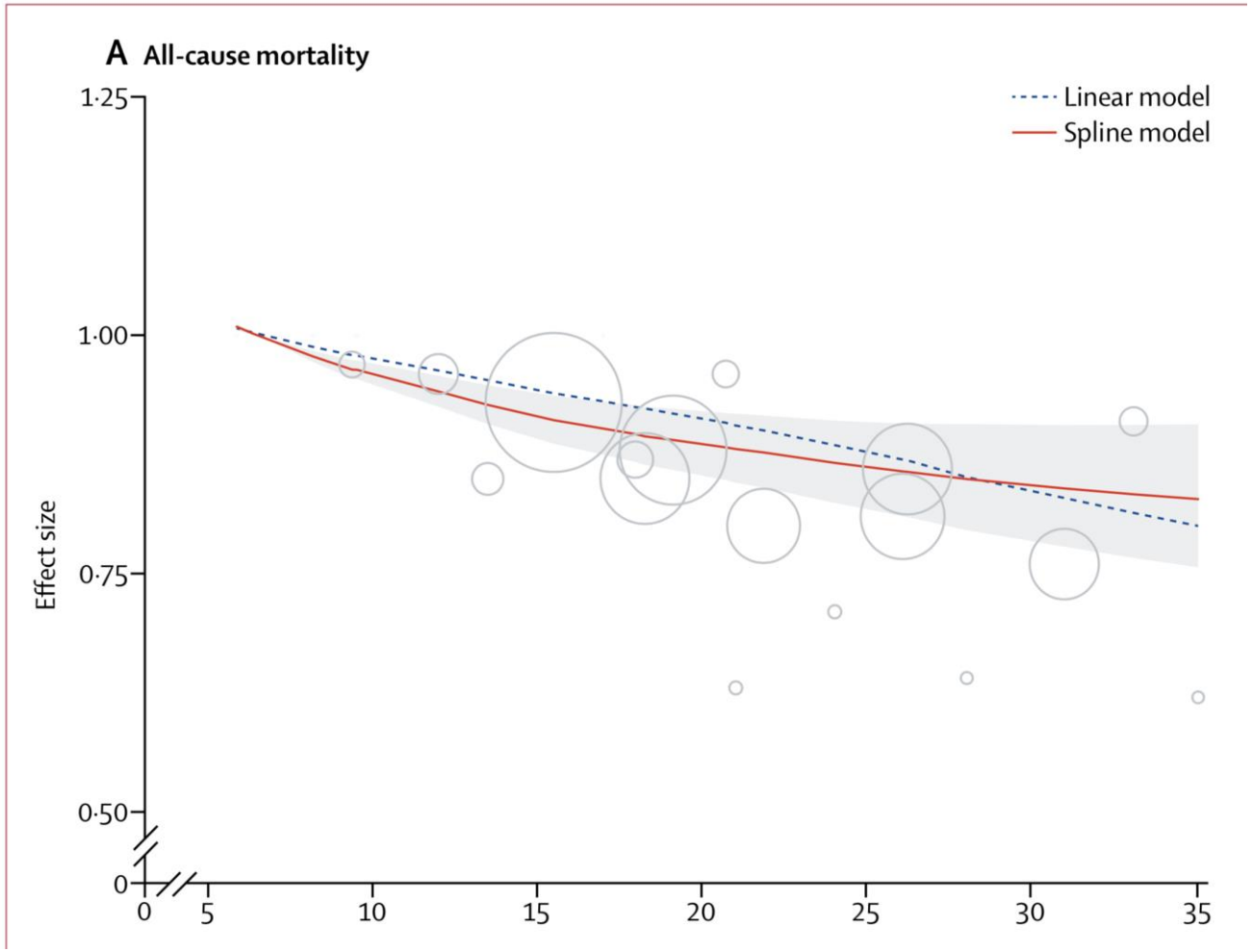


Am J Clin Nutr (in press)

Carbohydrate quality and human health: a series of systematic reviews and meta-analyses

Lancet. 2019 Feb 2;393(10170):434-45

Andrew Reynolds, Jim Mann, John Cummings, Nicola Winter, Evelyn Mete, Lisa Te Morenga



Sal?



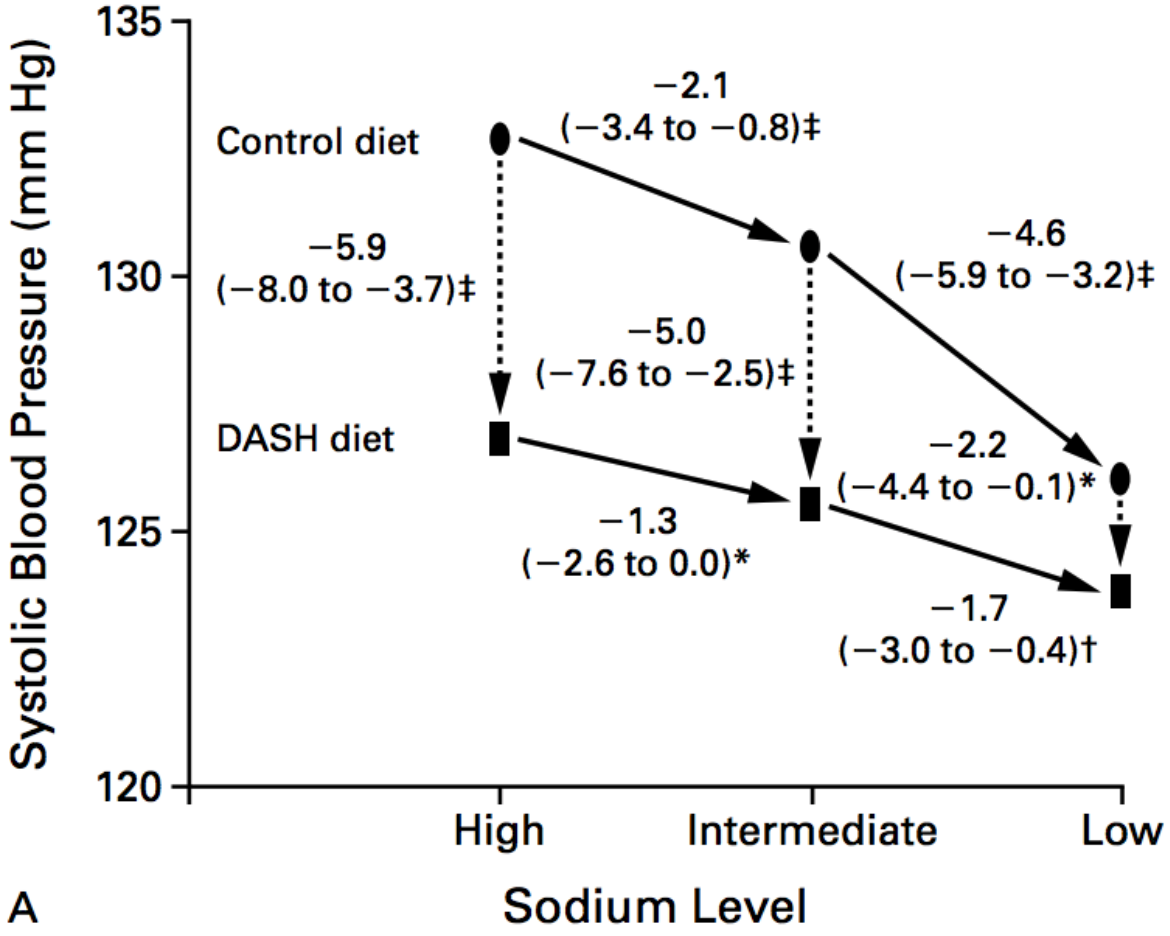


VOLUME 344 JANUARY 4, 2001 NUMBER 1

EFFECTS ON BLOOD PRESSURE OF REDUCED DIETARY SODIUM AND THE DIETARY APPROACHES TO STOP HYPERTENSION (DASH) DIET

FRANK M. SACKS, M.D., LAURA P. SVETKEY, M.D., WILLIAM M. VOLLMER, PH.D., LAWRENCE J. APPEL, M.D., GEORGE A. BRAY, M.D., DAVID HARSHA, PH.D., EVA OBARZANEK, PH.D., PAUL R. CONLIN, M.D., EDGAR R. MILLER III, M.D., PH.D., DENISE G. SIMONS-MORTON, M.D., PH.D., NJERI KARANJA, PH.D., AND PAO-HWA LIN, PH.D., FOR THE DASH–SODIUM COLLABORATIVE RESEARCH GROUP

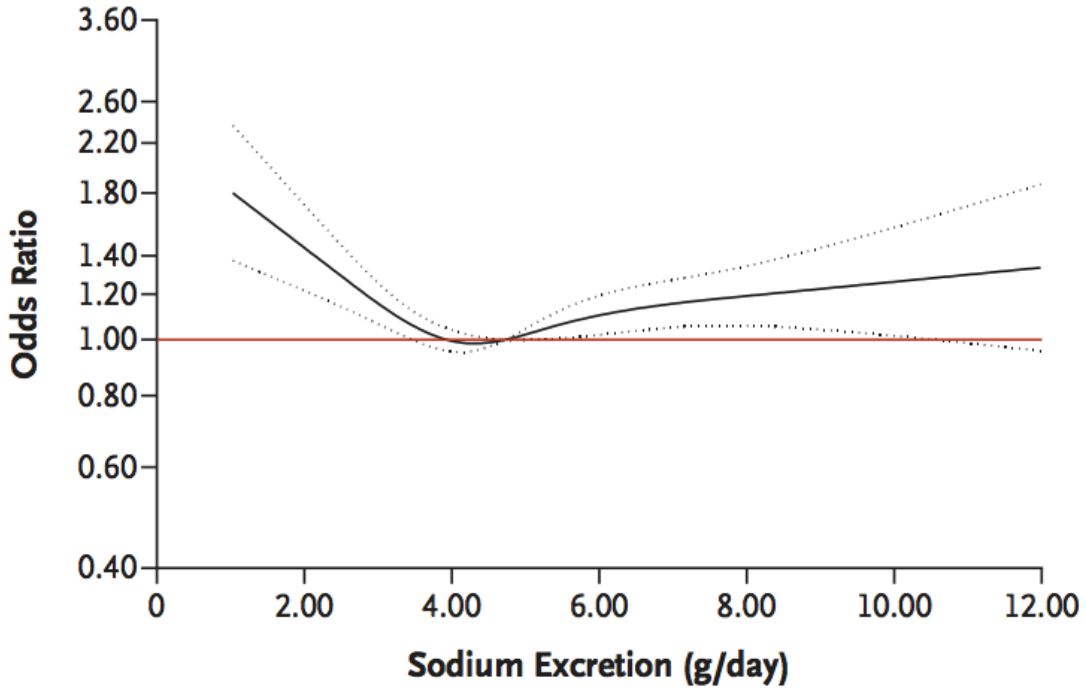
Dietary Approaches to Stop Hypertension



Prospective Urban Rural Epidemiology (PURE)

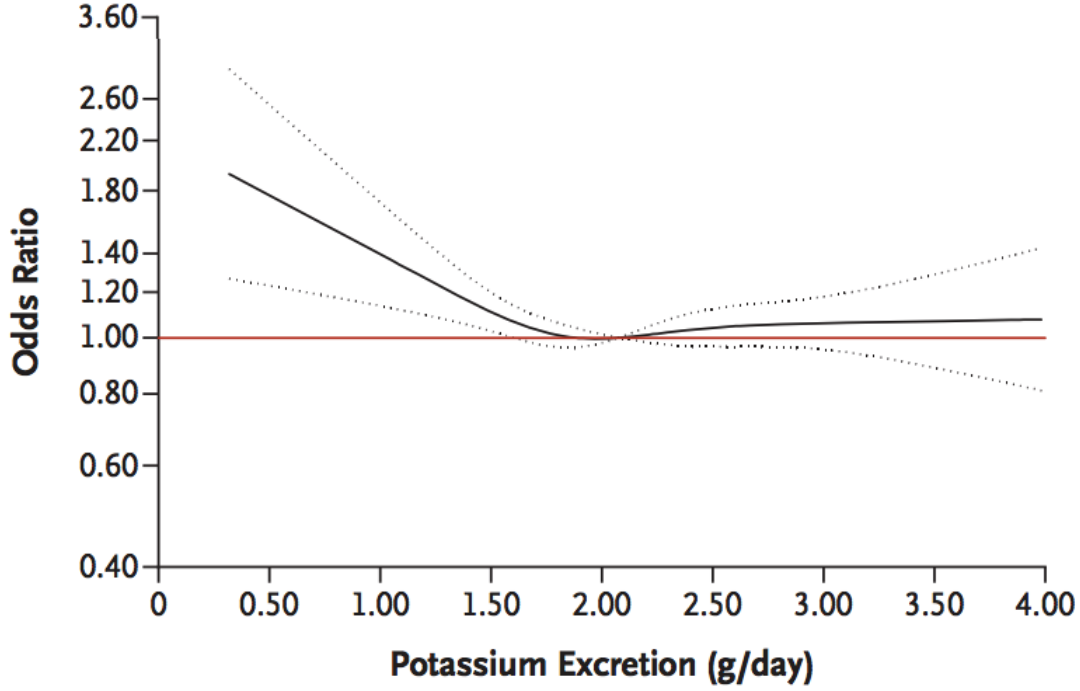
N: 101,945. Mean follow-up: 3.7 y. (N Engl J Med 2014;371:612-23)

C Estimated Sodium Excretion and Risk of Major Cardiovascular Events



No. of Events	57	602	869	369	75	13
No. at Risk	1817	30,124	46,663	18,395	3885	756

C Estimated Potassium Excretion and Risk of Major Cardiovascular Events



No. of Events	0	41	241	623	586	334	129	23
No. at Risk	6	1730	12,526	31,466	30,956	17,171	6128	1507

Lower Levels of Sodium Intake and Reduced Cardiovascular Risk

Circulation. 2014;129:981-9.

Nancy R. Cook, ScD; Lawrence J. Appel, MD, MPH; Paul K. Whelton, MB, MD, MSc

Trials of Hypertension Prevention (TOHP) Follow-up

multiple 24-hour urine specimens

	Sodium Excretion, mg/d					
	<2300	2300 to <3600	3600 to <4800	≥4800		
TOHP I						
CVD events/total	15/189 (7.9)	48/590 (8.1)	40/427 (9.4)	23/191 (12.0)		
TOHP II						
CVD events/total	2/47 (4.3)	13/303 (4.3)	34/341 (10.0)	18/224 (8.0)		
Model 1					HR per 1000 mg/d	*P* Value
HR	0.92	0.80	1.00	1.11		
95% CI	0.53–1.60	0.56–1.13	(Reference)	0.75–1.64	1.18	0.025
Model 2					1.02–1.36	…
HR	0.87	0.78	1.00	1.12		
95% CI	0.48–1.58	0.54–1.13	(Reference)	0.74–1.67		

Sodium & Salt
Salt: 60% Cl & 40% Na

1 g Na =
2.5 g Salt

Most of the global population consumes between

- **3.0 and 6.0 g of sodium** per day
- **7.5 to 15.0 g of salt** per day

Guidelines on CVD prevention recommend a **maximum sodium** intake of

- **1.5 to 2.4 g** per day (5 g salt)
- but achieving this target will require a substantial change in diet for most people→**< 4 g/d of SALT**

Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017

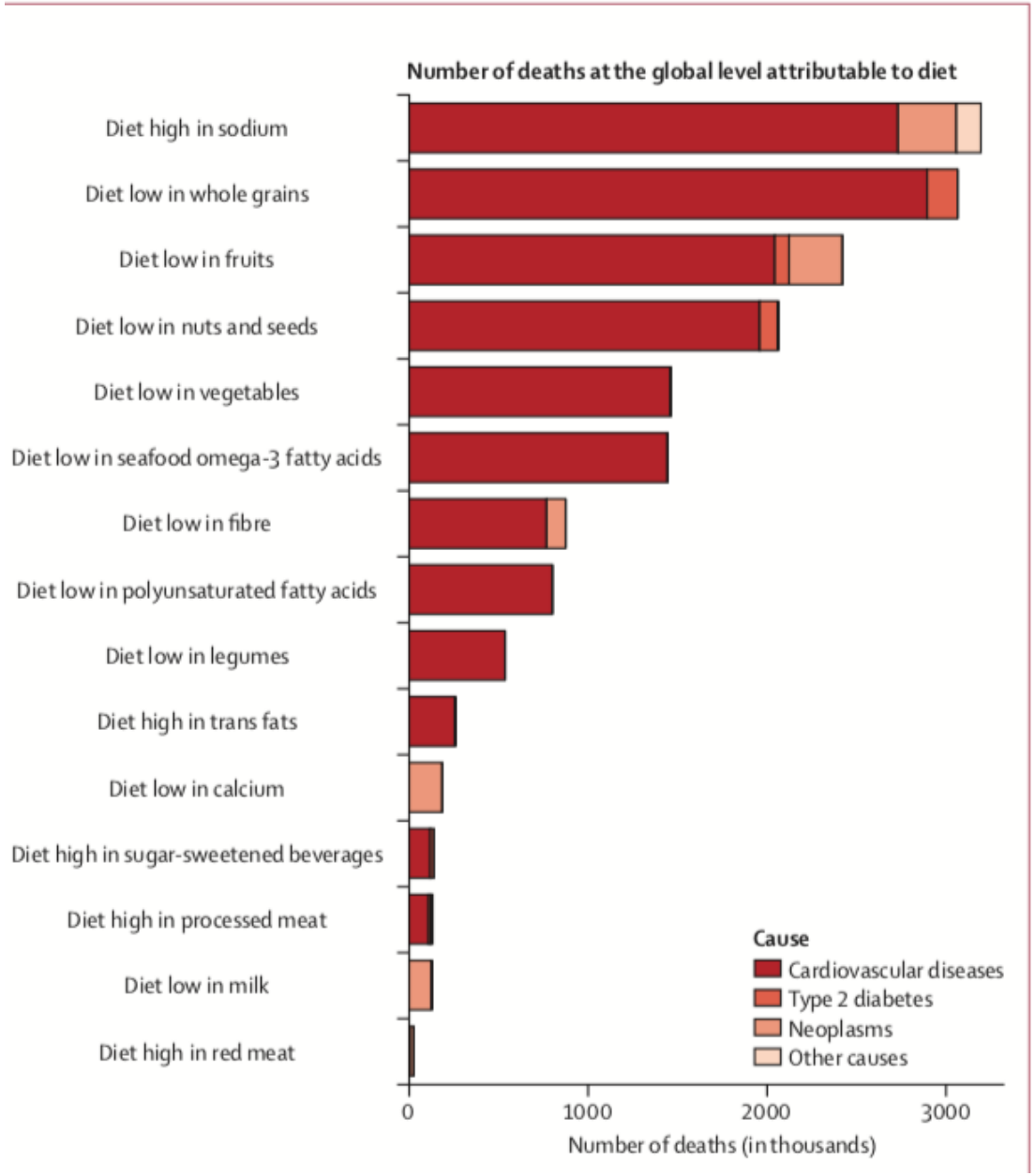
GBD 2017 Diet Collaborators*

Lancet 2019; 393: 1958–72

Our findings show that suboptimal diet is responsible for more deaths than any other risks globally, including tobacco smoking,[11,12] highlighting the urgent need for improving human diet across nations. Although sodium, sugar, and fat have been the main focus of diet policy debate in the past two decades,[27,28] our assessment shows that the leading dietary risk factors for mortality are diets high in sodium, low in whole grains, low in fruit, low in nuts and seeds, low in vegetables, and low in omega-3 fatty acids; each accounting for more than 2% of global deaths.

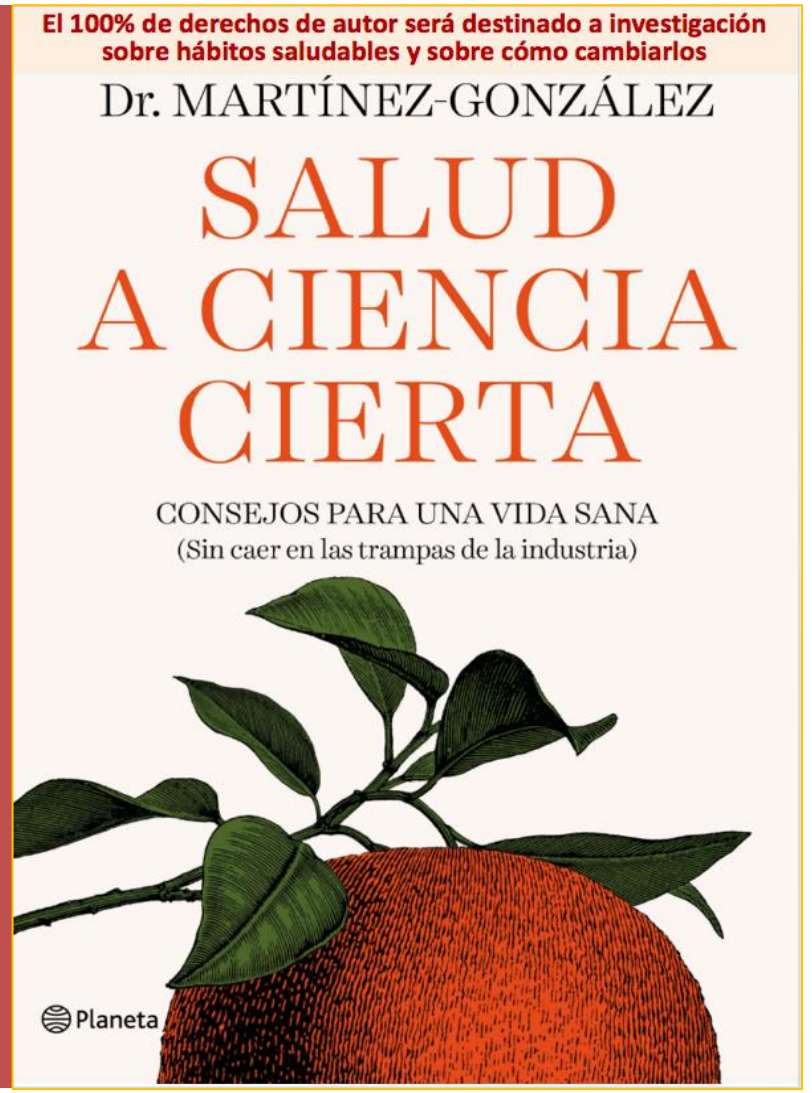
Impact of individual components of diet on mortality

A small number of dietary risks had a large impact on health outcomes. In 2017, more than half of diet-related deaths and two-thirds of diet-related DALYs were attributable to high intake of sodium (3 million [95% UI 1–5] deaths and 70 million [34–118] DALYs



No disenso, sino "a ciencia cierta"

- ✓ Carnes rojas y procesadas
- ✓ Grasa saturada
- ✓ Huevo
- ✓ Pan blanco-patatas-pasta-arroz
- ✓ Sal



EPIDEMIOLOGIA NUTRICIONAL

EVIDENCIA OBSERVACIONAL

CEIPV

DISENSOS

PREDIMED Y PREDIMED-Plus

EPIDEMIOLOGIA NUTRICIONAL

EVIDENCIA OBSERVACIONAL

CEIPV

DISENSOS

PREDIMED Y PREDIMED-Plus

7447
participants

Free of CVD (primary prevention)

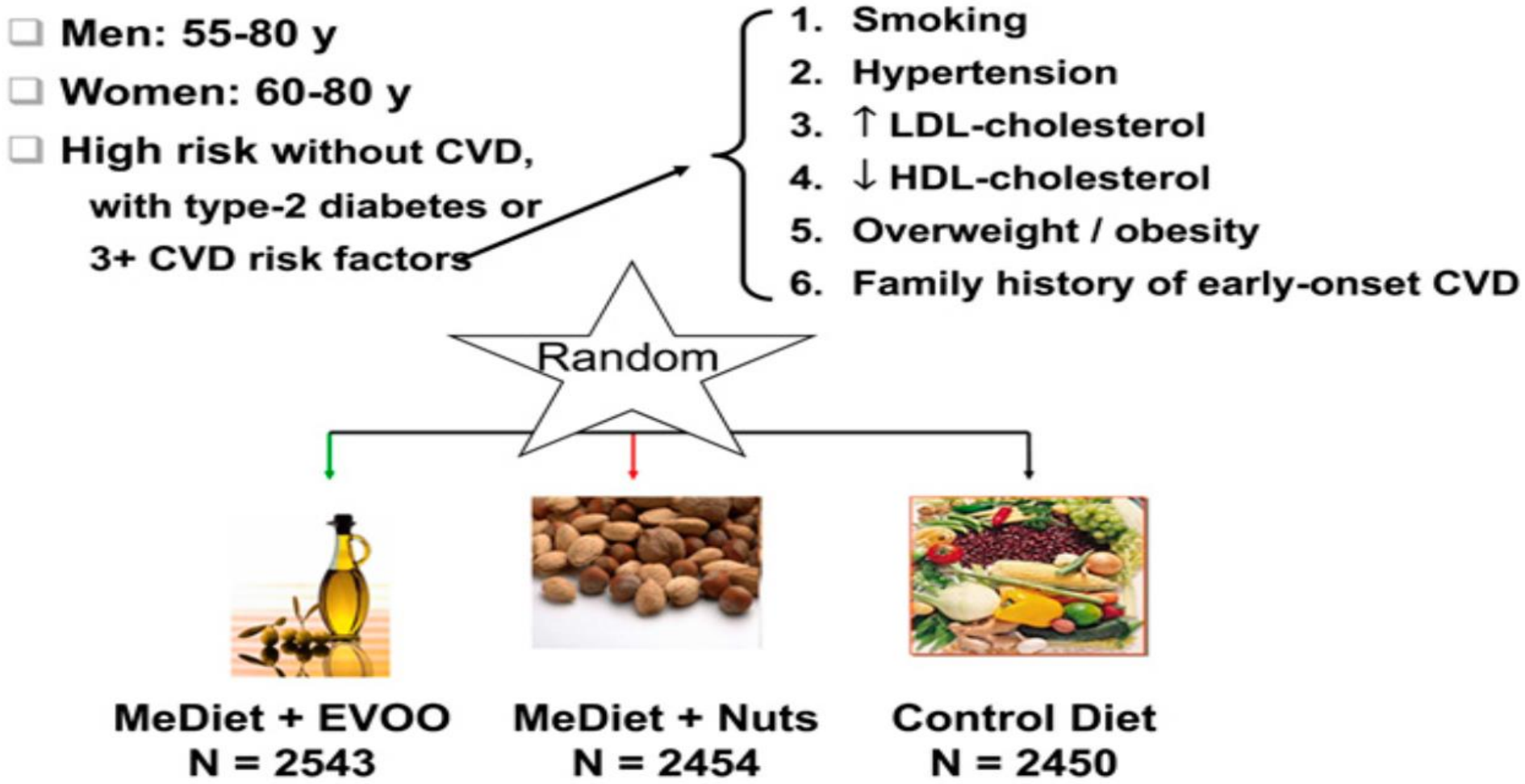


FIGURE 1 Design of the PREDIMED (Prevención con Dieta Mediterránea) study. CVD, cardiovascular disease; EVOO, extra-virgin olive oil; MeDiet, Mediterranean diet.

Prediméd
Prevención con Dieta Mediterránea

3+2

1

3/wk

4











3/wk





3/wk



2/wk



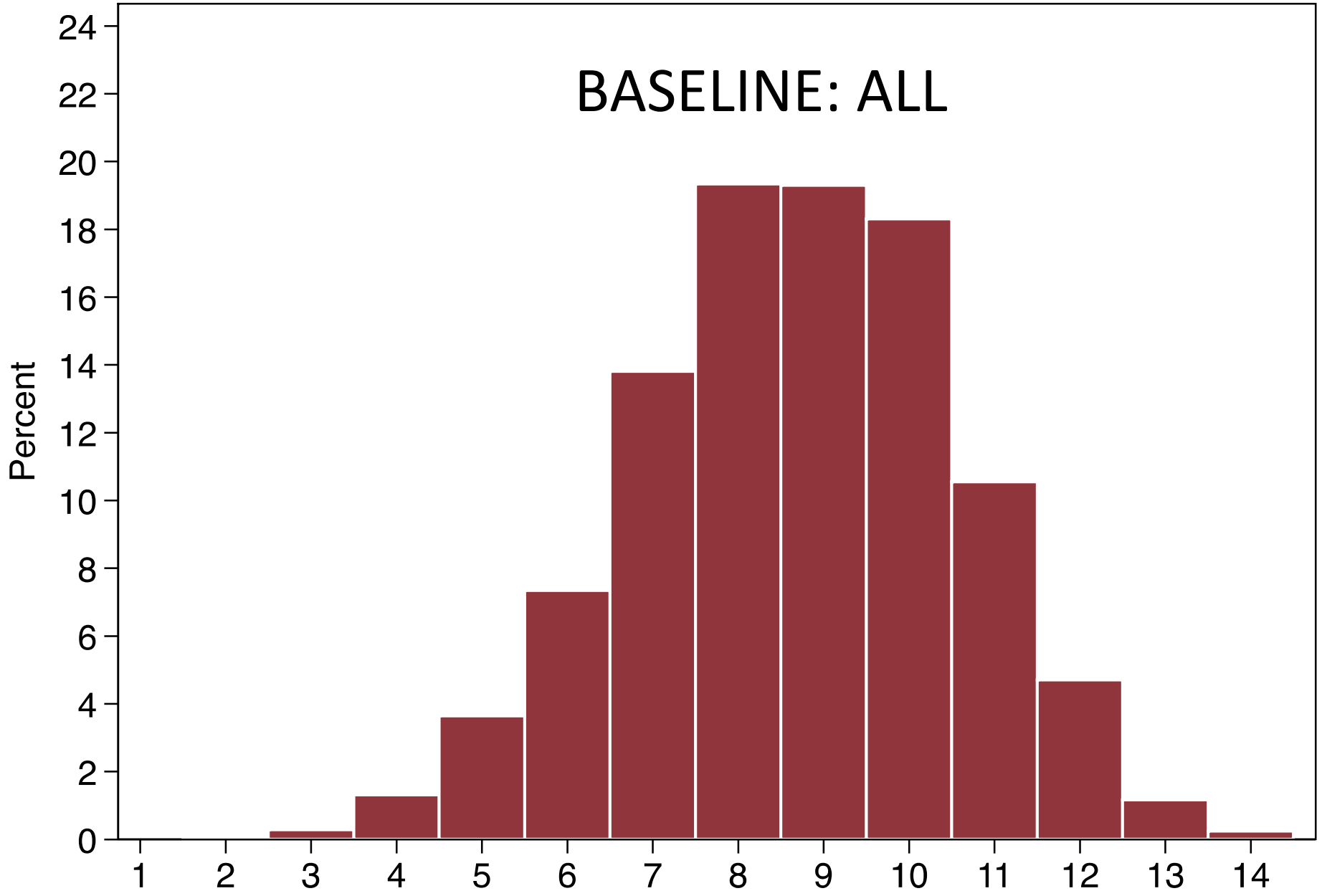




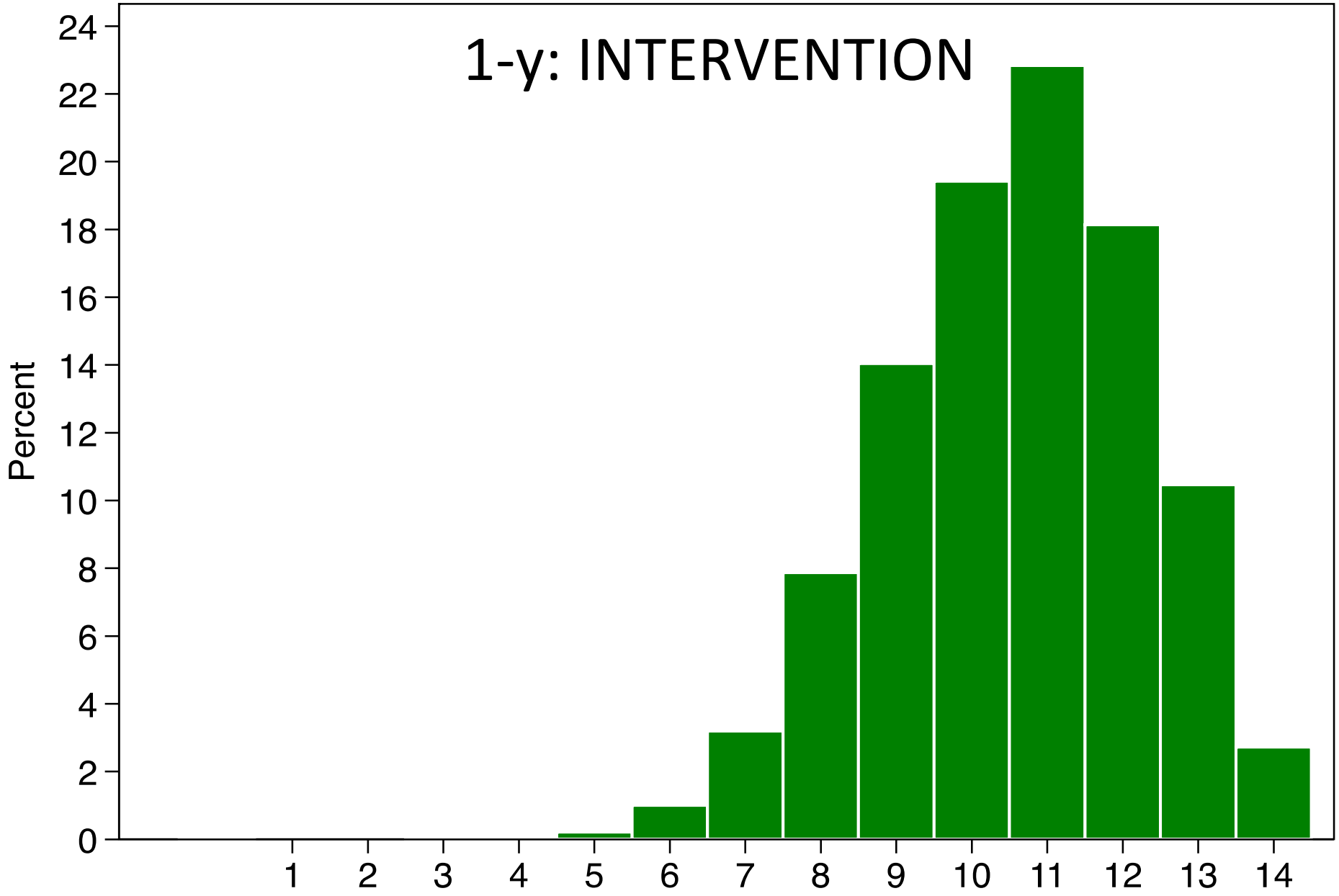






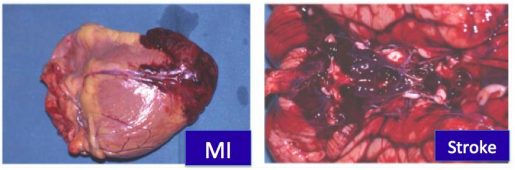


14-item predimed questionnaire



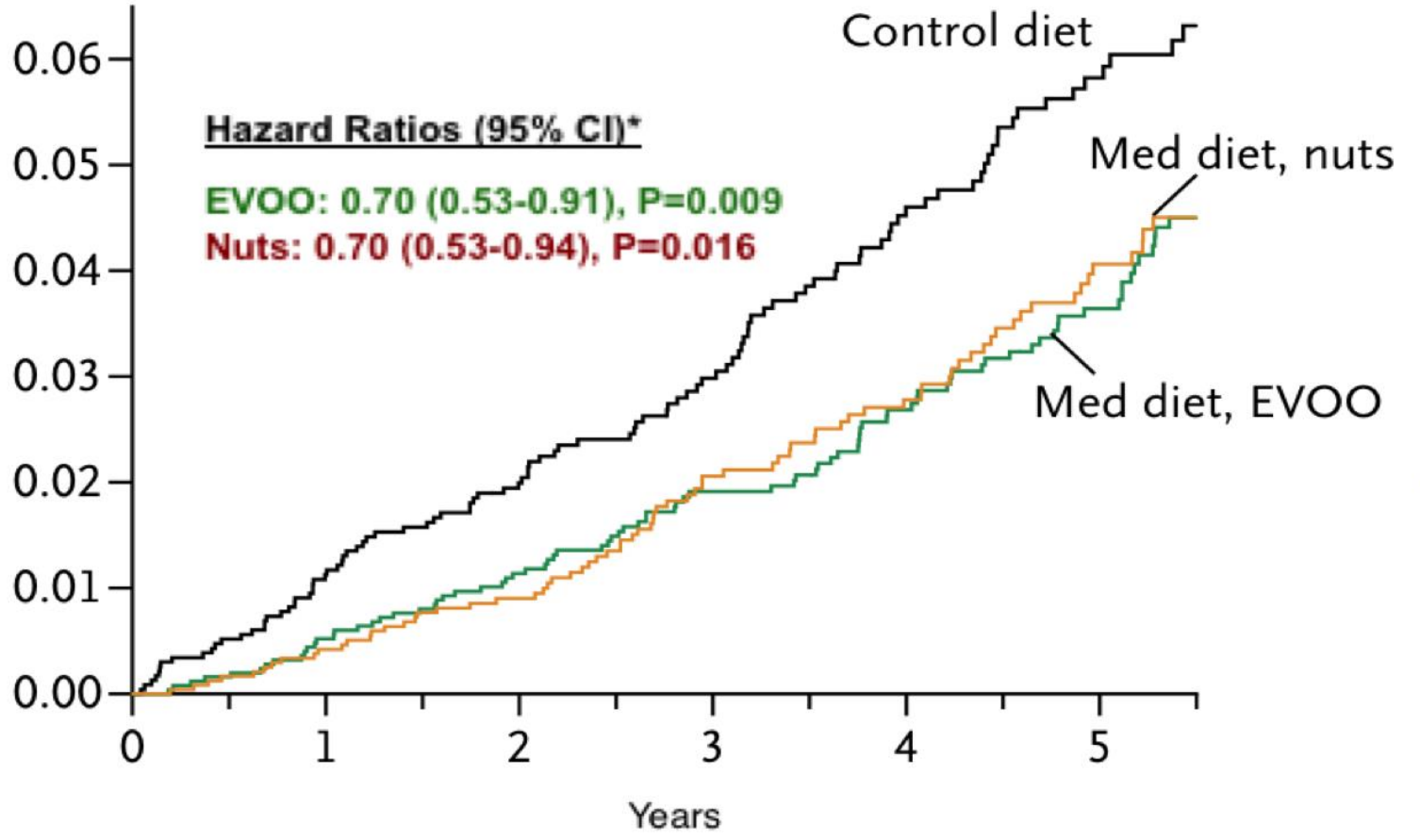
14-item predimed questionnaire

Myocardial Infarction– Heart Attack
Cerebrovascular disease– Stroke
Cardiovascular deaths



N Engl J Med 2013;368:1279-90

Prediméd
Prevención con Dieta Mediterránea





↓30%



↓30%

Number at risk

Control group	2450	2268	2020	1583	1268	946
MeDiet+EVOO	2543	2486	2320	1987	1687	1310
MeDiet+Nuts	2454	2343	2093	1657	1389	1031

N Engl J Med 2013;368:1279-90
Altmetric 3,078 // Citations: 1,608 (google scholar)
[Up to March 24, 2016]

PREDIMED
Prevención con Dieta Mediterránea



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Title	Primary Prevention of Cardiovascular Disease with a Mediterranean Diet.
Published in	New England Journal of Medicine, February 2013
DOI	10.1056/nejmoa1200303
Pubmed ID	23432189
Authors	Ramón Estruch, Emilio Ros, Jordi Salas-Salvadó, Maria-Isabel Covas, D.Pharm., Dolores Corella, Fernando Arós, Enrique Gómez-Gracia, Valentina Ruiz-Gutiérrez, Miquel Fiol, José Lapetra, Rosa Maria Lamuela-Raventos, Lluís Serra-Majem, Xavier Pintó, Josep Basora, Miguel Angel Muñoz, José V. Sorlí, José Alfredo Martínez, Miguel Angel Martínez-González, Estruch R, Ros E, Salas-Salvadó J, Covas MI, D Pharm, Corella D, Arós F, Gómez-Gracia E, Ruiz-Gutiérrez V, Fiol M, Lapetra J, Lamuela-Raventos RM, Serra-Majem L, Pintó X, Basora J, Muñoz MA, Sorlí JV, Martínez JA, Martínez-González MA [hide]
Abstract	Observational cohort studies and a secondary prevention trial have shown an inverse association... [show]

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DOG

Endgames
Statistical Question

Random sampling versus random allocation

BMJ 2011 ; 343 doi: https://doi.org/10.1136/bmj.d7453 (Published 23 November 2011)
Cite this as: *BMJ* 2011;343:d7453

Anaesthesia 2017

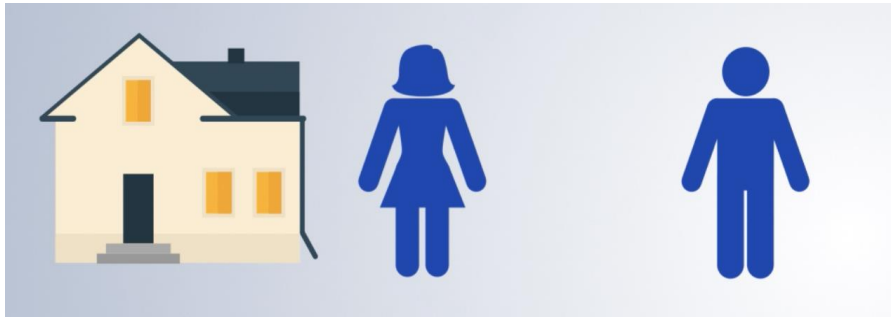
Original Article

Data fabrication and other reasons for non-random sampling in 5087 randomised, controlled trials in anaesthetic and general medical journals

J. B. Carlisle

The PREDIMED steering committee was proactive

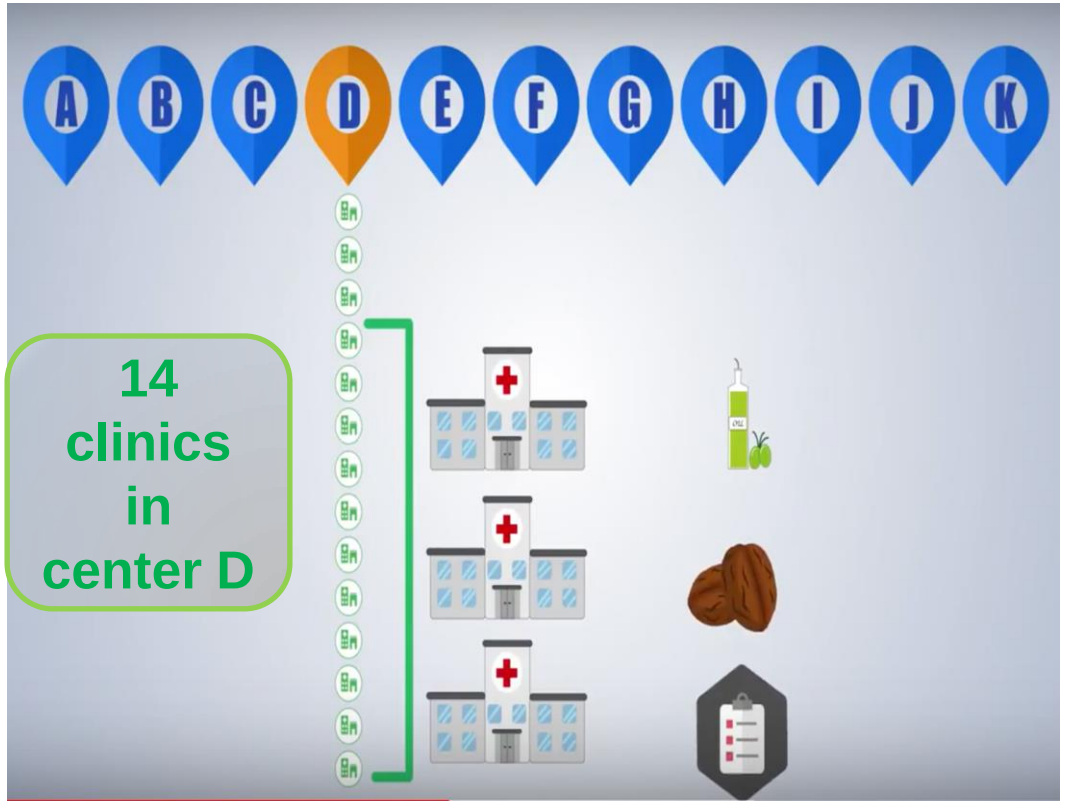
June 2017: We took the initiative to contact the editors of NEJM & reviewing all procedures



- Assigning all participants in a household to the same diet was viewed as **the best approach** to achieve dietary changes in the household.

- The **2nd** enrolled partners of a previous participant (**n=425**) represented **5.7%** of PREDIMED participants, with %:
  - Control: **4.8%**
  - MedDiet +EVOO: **6.7%**
  - MedDiet +nuts: **5.5%**

11 centers, ~200 clinics



allocation by **clusters** (by small clinics), instead of individual allocation of **a small subset** of participants

In **only *1*** *of 11* centers (**center D**) affecting **467** participants (**6.2%** of total PREDIMED participants)

in **11** *of the 14* clinics of **center D**:

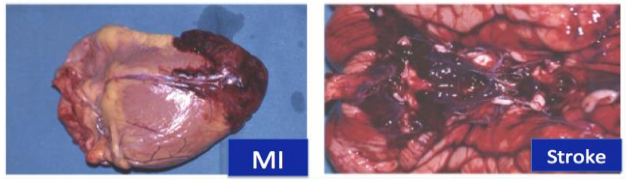
- **2** allocated to MedDiet+EVOO
- **5** allocated to MedDiet + nuts
- **4** allocated to control

www.predimed.es

June 2018
Re-PUBLICATION

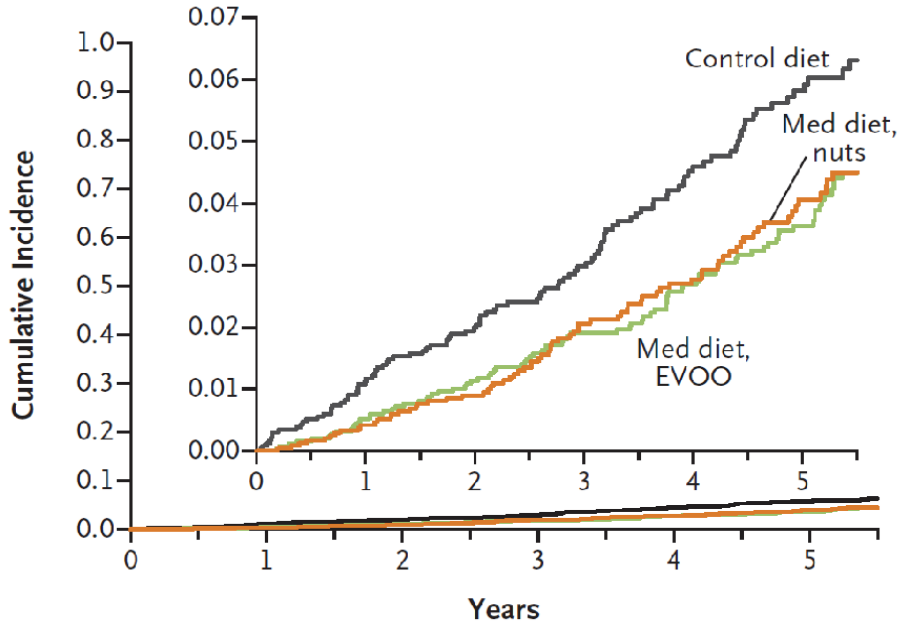
PREDIMED
Prevención con Dieta Mediterránea

Myocardial Infarction– Heart Attack
Cerebrovascular disease– Stroke
Cardiovascular deaths



A Primary End Point (acute myocardial infarction, stroke, or death from cardiovascular causes)

Med diet, EVOO: hazard ratio, 0.69 (95% CI, 0.53–0.91)
Med diet, nuts: hazard ratio, 0.72 (95% CI, 0.54–0.95)



No. at Risk

Control diet	2450	2268	2020	1583	1268	946
Med diet, EVOO	2543	2486	2320	1987	1687	1310
Med diet, nuts	2454	2343	2093	1657	1389	1031

The NEW ENGLAND JOURNAL of MEDICINE

Primary Prevention of Cardiovascular Disease with a Mediterranean Diet Supplemented with Extra-Virgin Olive Oil or Nuts

R. Estruch, E. Ros, J. Salas-Salvadó, M.-I. Covas, D. Corella, F. Arós, E. Gómez-Gracia, V. Ruiz-Gutiérrez, M. Fiol, J. Lapetra, R.M. Lamuela-Raventos, L. Serra-Majem, X. Pintó, J. Basora, M.A. Muñoz, J.V. Sorlí, J.A. Martínez, M. Fitó, A. Gea, M.A. Hernán, and M.A. Martínez-González, for the PREDIMED Study Investigators*

This article was published on June 13, 2018, at NEJM.org. DOI: 10.1056/NEJMoa1800389

ADDRESSING 2ND COUPLES AND CLUSTERS OF CLINICS

HAZARD RATIOS (95% CI) FOR MAJOR CARDIOVASCULAR EVENTS VERSUS CONTROL DIET (LOW FAT DIET)	MEDITERRANEAN DIET + EXTRAVIRGIN OLIVE OIL	MEDITERRANEAN DIET + NUTS
ORIGINAL ANALYSIS 2013	0.70 (0.53-0.92)	0.70 (0.53-0.94)
ANALYSIS ADJUSTED FOR INTRA-CLUSTER CORRELATION, PROPENSITY SCORES AND CARDIOVASCULAR RISK FACTORS 2018	0.69 (0.53-0.91)	0.72 (0.54-0.95)



	Mediterranean Diet	Control Diet	Hazard Ratio (95% CI)
	no. of events/total no. of participants		
Unadjusted ITT analysis			
Mediterranean diet with EVOO	96/2543	109/2450	0.70 (0.53–0.92)
Mediterranean diet with nuts	83/2454	109/2450	0.70 (0.53–0.94)
Adjusted ITT analysis			
Mediterranean diet with EVOO	96/2543	109/2450	0.69 (0.53–0.91)
Mediterranean diet with nuts	83/2454	109/2450	0.72 (0.54–0.95)

N Engl J Med 2018;378:e34

The NEW ENGLAND JOURNAL of MEDICINE

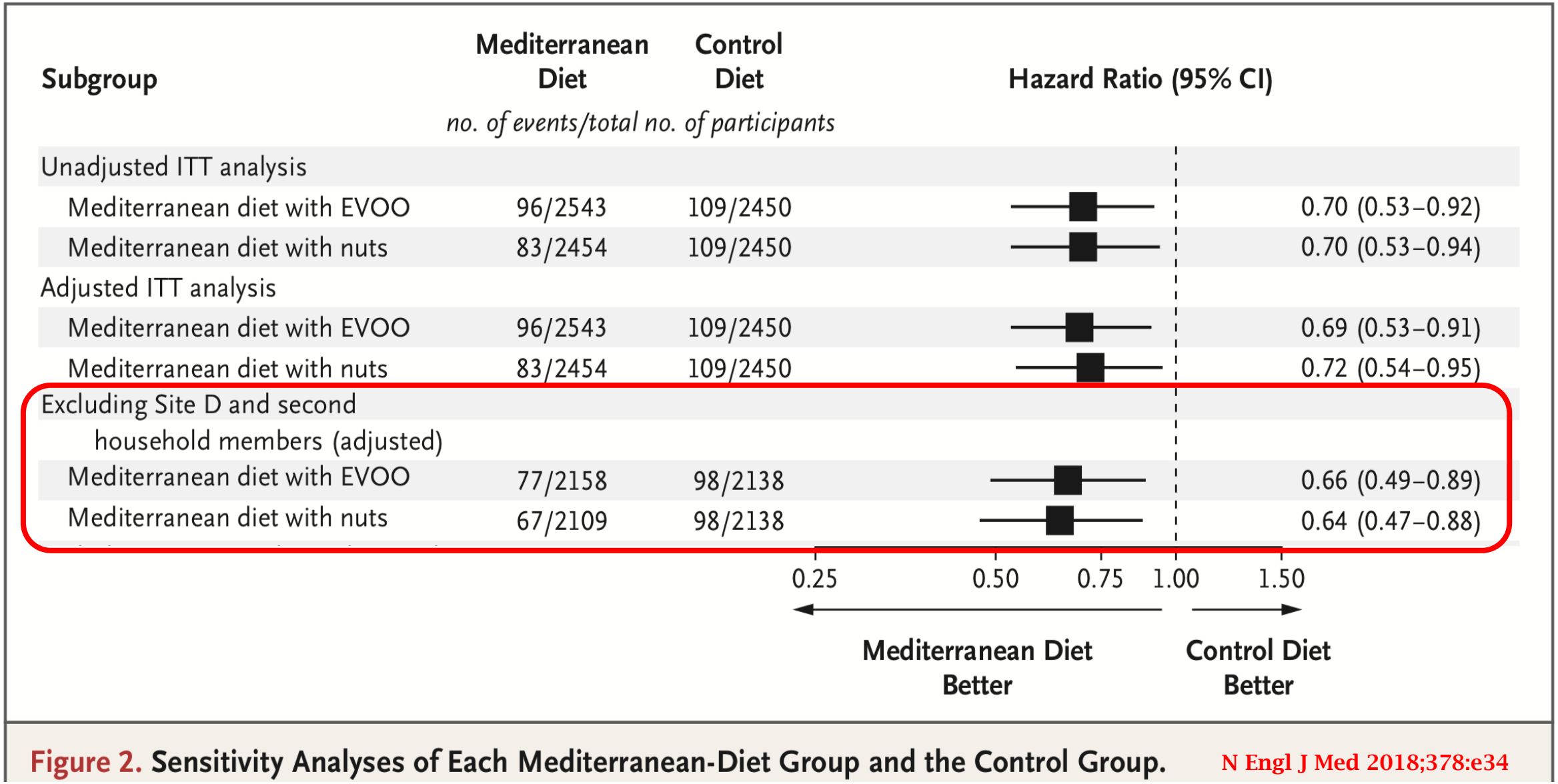


Figure 2. Sensitivity Analyses of Each Mediterranean-Diet Group and the Control Group. N Engl J Med 2018;378:e34

https://www.acc.org/latest-in-cardiology/journal-scans/2018/06/15/10/21/primary-prevention-of-cvd-with-a-mediterranean

Perspective:

The authors are to be congratulated for the re-analysis of this very important study, which many will be happy to quote. Observational studies have supported the value of the Mediterranean diet as well as olive oil and nut supplements. This randomized study is particularly strong in that it was conducted in a high-risk cohort and powered adequately in a population that often follows the Mediterranean diet, which is already high in nuts and olive oil.



AMERICAN COLLEGE *of* CARDIOLOGY

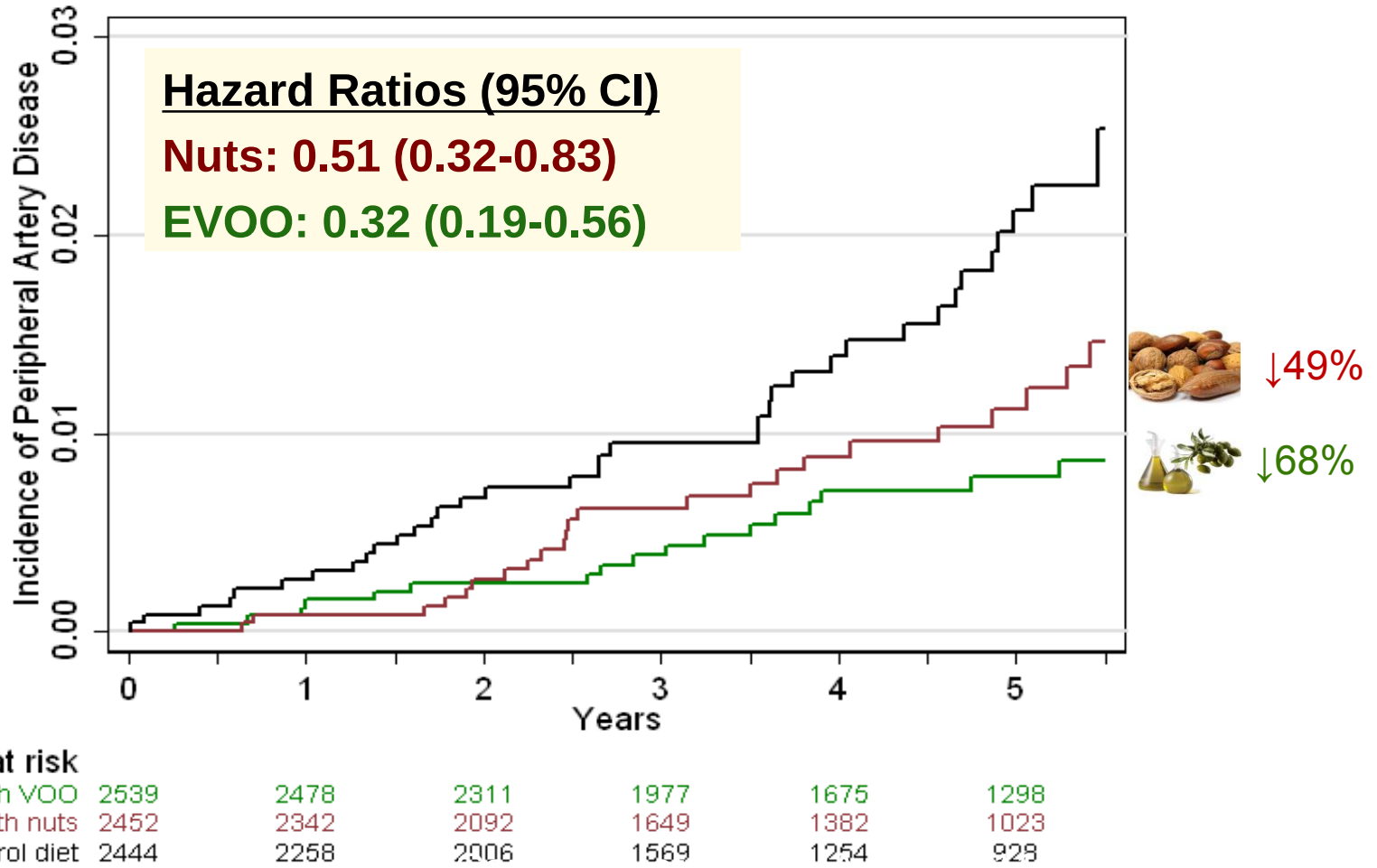
Peripheral Artery Disease



N = 89 cases

Follow-up 4.8 y

Ruiz-Canela et al. JAMA 2014; 311:415-7.



www.predimed.es

Extravirgin Olive Oil Consumption Reduces Risk of Atrial Fibrillation

The PREDIMED (Prevención con Dieta Mediterránea) Trial

Miguel Á. Martínez-González, MD, PhD; Estefanía Toledo, MD, PhD; Fernando Arós, MD, PhD; Miquel Fiol, MD, PhD; Dolores Corella, DPharm, PhD; Jordi Salas-Salvadó, MD, PhD; Emilio Ros, MD, PhD; Maria I. Covas, DPharm, PhD; Joaquín Fernández-Crehuet, MD, PhD; José Lapetra, MD, PhD; Miguel A. Muñoz, MD, PhD; Monserrat Fitó, MD, PhD; Luis Serra-Majem, MD, PhD; Xavier Pintó, MD, PhD; Rosa M. Lamuela-Raventós, DPharm, PhD; Jose V. Sorlí, MD, PhD; Nancy Babio, BSc, PhD; Pilar Buil-Cosiales, MD, PhD; Valentina Ruiz-Gutierrez, PhD; Ramón Estruch, MD, PhD; Alvaro Alonso, MD, PhD; for the PREDIMED Investigators*

Circulation 2014;130:18-26

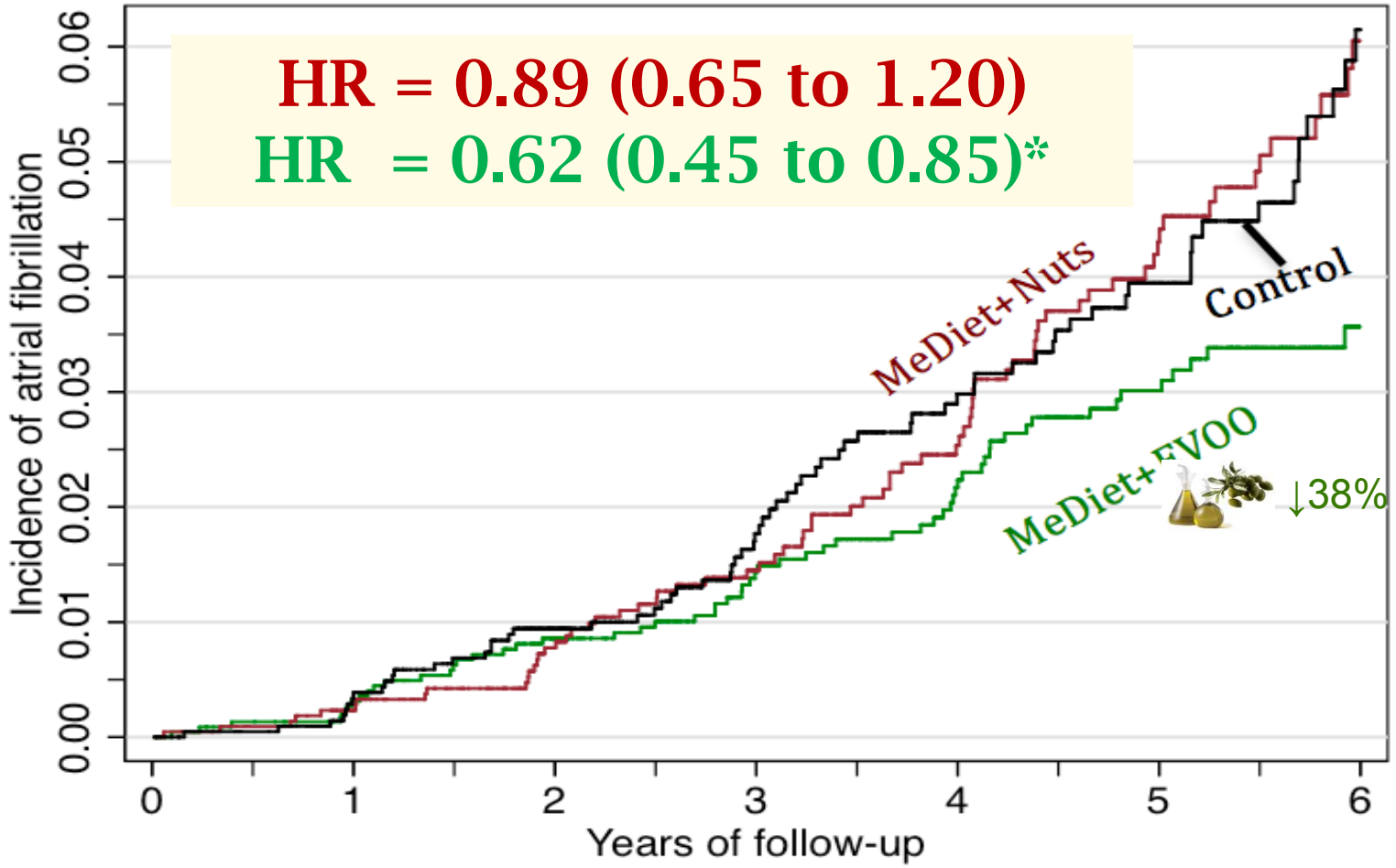
Predimed
Prevención con Dieta Mediterránea

Atrial Fibrillation



HR = 0.89 (0.65 to 1.20)

HR = 0.62 (0.45 to 0.85)*



Number at risk

g = MeDiet+EVOO	2292	2234	2097	1798	1511	1144	496
g = MeDiet+Nuts	2210	2113	1899	1499	1244	903	387
g = Control	2203	2044	1837	1438	1152	851	358

www.predimed.es

www.predimed.es/publications

2019

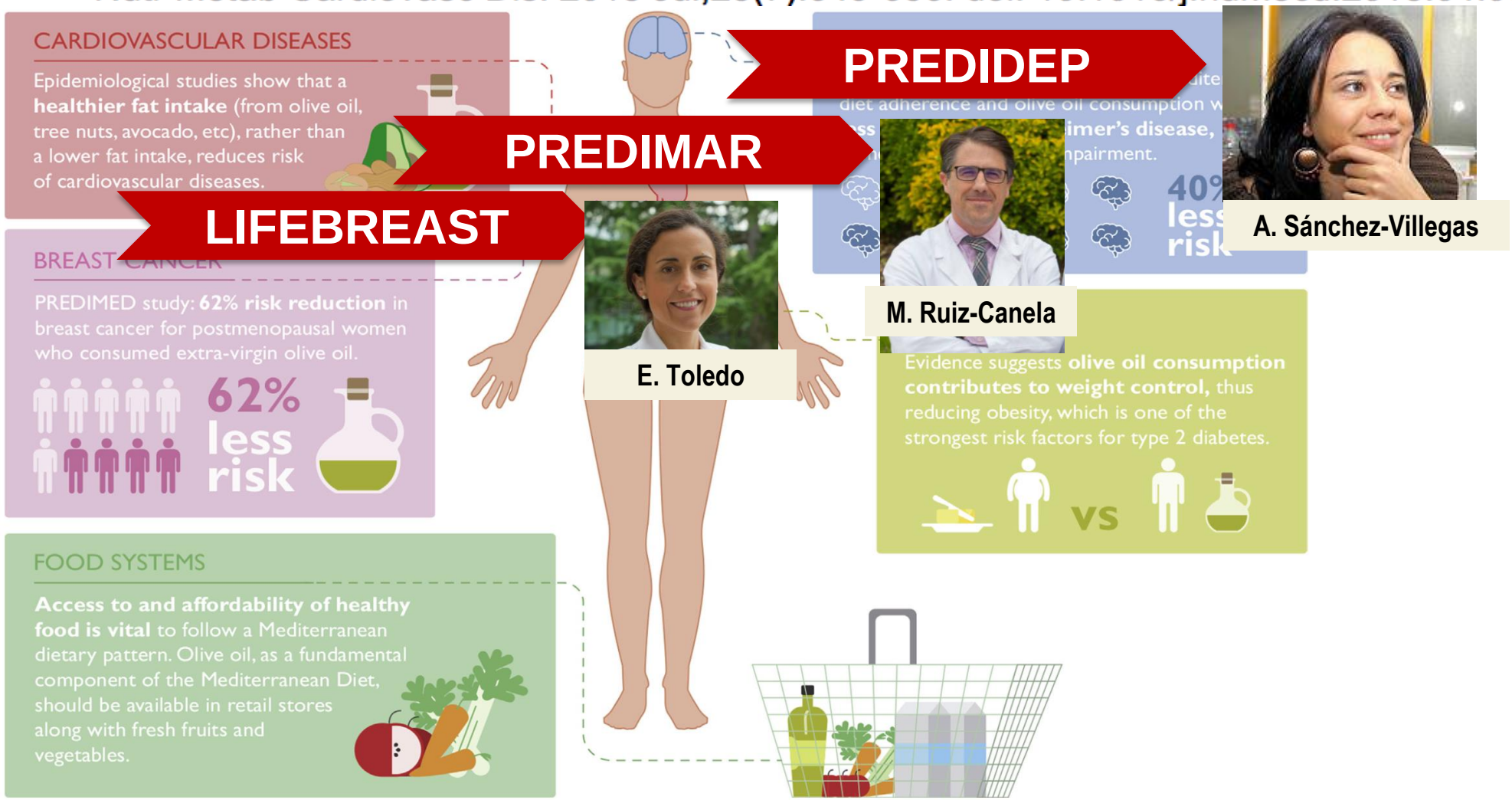
306. Basterra-Gortari FJ, Ruiz-Canela M, Martínez-González MA, et al.
Effects of a Mediterranean Eating Plan on the Need for Glucose-Lowering Medications in Participants With Type 2 Diabetes: A Subgroup Analysis of the PREDIMED Trial.
Diabetes Care. 2019;42:1390-1397.

305. Pintó X, Fanlo-Maresma M, Corbella E, et al.
A Mediterranean Diet Rich in Extra-Virgin Olive Oil Is Associated with a Reduced Prevalence of Nonalcoholic Fatty Liver Disease in Older Individuals at High Cardiovascular Risk.
J Nutr. 2019 Jul 23. doi: 10.1093/jn/nxz147.

[Olive oil and prevention of chronic diseases: Summary of an International conference.]

Visioli F, Franco M, Toledo E, Luchsinger J, **Willett WC**, Hu FB, **Martinez-Gonzalez MA**.

Nutr Metab Cardiovasc Dis. 2018 Jul;28(7):649-656. doi: 10.1016/j.numecd.2018.04.004.





PREDIMED-PLUS DESIGN

predimed plus

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Instituto de Salud Carlos III

predimed plus

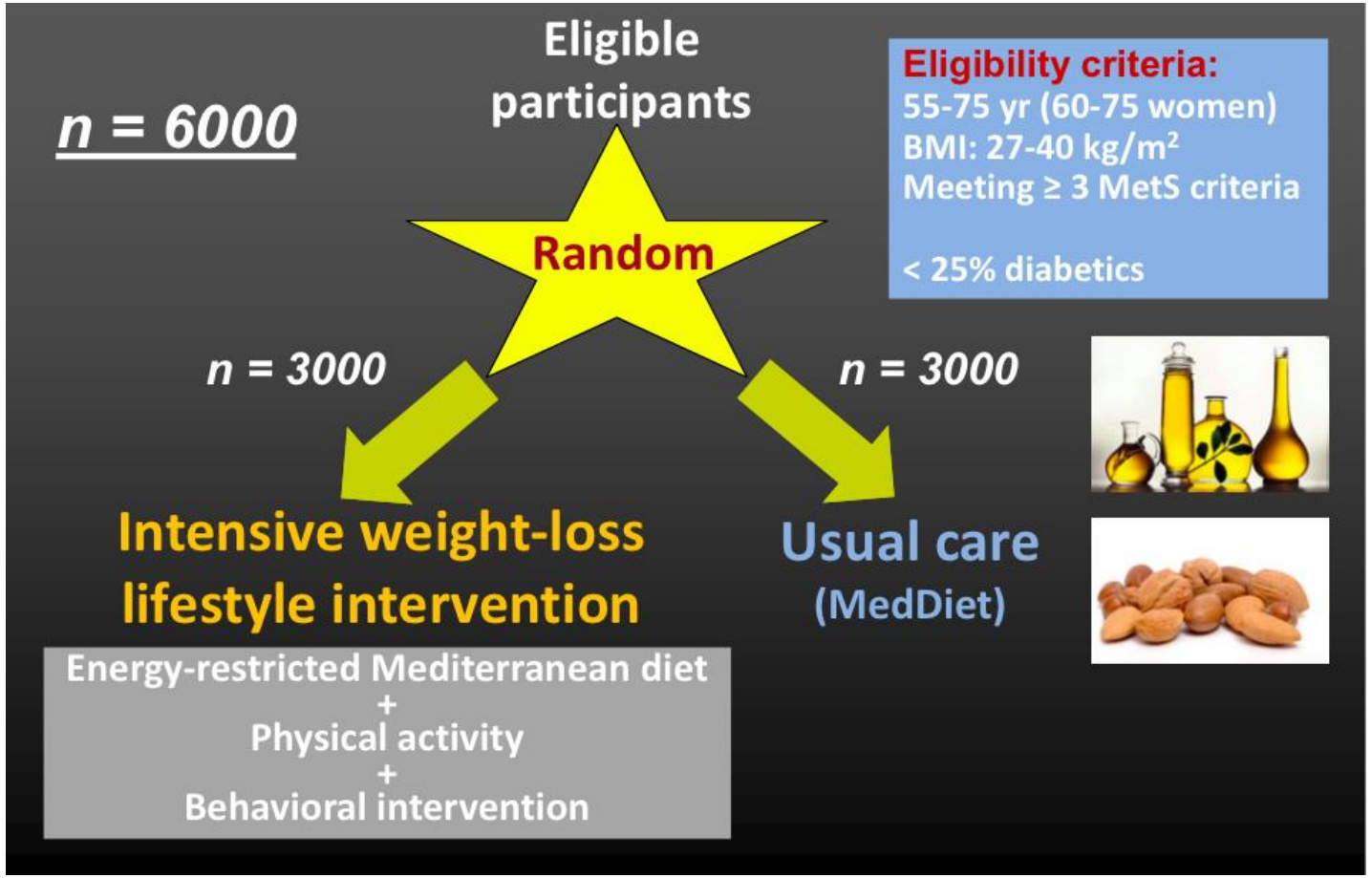
Predimed

MedDiet
+ Energy restriction
+ Physical activity
+ Behavioral intervention

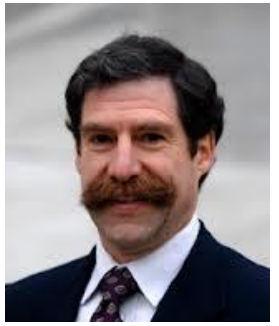
MedDiet

Low-fat

Weight loss → long-term maintenance → ↓ CVD



predimed plus











Effect of a Lifestyle Intervention Program With Energy-Restricted Mediterranean Diet and Exercise on Weight Loss and Cardiovascular Risk Factors: One-Year Results of the PREDIMED-Plus Trial

https://doi.org/10.2337/dc18-0836

Jordi Salas-Salvadó,[1,2] Andrés Díaz-López,[1,2] Miguel Ruiz-Canela,[2,3] Josep Basora,[1,2,4] Montse Fitó,[2,5] Dolores Corella,[2,6] Luís Serra-Majem,[2,7] Julia Wärnberg,[2,8] Dora Romaguera,[2,9] Ramon Estruch,[2,10] Josep Vidal,[11,12,13] J. Alfredo Martínez,[2,14,15] Fernando Arós,[2,16] Clotilde Vázquez,[2,17] Emilio Ros,[2,18] Jesús Vioque,[19,20] José López-Miranda,[2,21] Aurora Bueno-Cavanillas,[20,22] Josep A. Tur,[2,23] Francisco J. Tinahones,[2,24] Vicente Martín,[20,25,26] José Lapetra,[2,27] Xavier Pintó,[2,28] Lidia Daimiel,[29] Miguel Delgado-Rodríguez,[20,30] Pilar Matía,[31] Enrique Gómez-Gracia,[2,32] Javier Díez-Espino,[2,3,33] Nancy Babio,[1,2] Olga Castañer,[2,5] José V. Sorlí,[2,6] Miquel Fiol,[2,9] María Ángeles Zulet,[2,14] Mònica Bulló,[1,2] Albert Goday,[2,5,34] Miguel A. Martínez-González,[2,3,35] J

Diabetes Care 2019;42:777-788.

Cohort Profile

Cohort Profile: Design and methods of the PREDIMED-Plus randomized trial

Miguel A Martínez-González,[1,2,3*#] Pilar Buil-Cosiales,[1,2,4] Dolores Corella,[1,5] Monica Bulló,[1,6] Montserrat Fitó,[1,7] Jesús Vioque,[8,9] Dora Romaguera,[1,10] J. Alfredo Martínez,[1,11] Julia Wärnberg,[1,12] Jose López-Miranda,[1,13] Ramón Estruch,[1,14] Aurora Bueno-Cavanillas,[8,15] Fernando Arós,[1,16] Josep A Tur,[1,17]

Int J Epidemiol 2019;48:387-388o



Oct 2013 to Dec 2016
Randomization: 6874

NAVARRA-EPI	MARTINEZ-GONZALEZ	628
VALENCIA-GENETICS	CORELLA	465
REUS-NUTRITION	SALAS-SALVADO	460
BARCELONA-MOL. BIOL.	FITO	407
ALICANTE-EPI	VIOQUE	361
BALEARIC-CARDIOLOGY	ROMAGUERA	335
NAVARRA-NUTRITION	JA MARTINEZ	331
MALAGA-EPI	GOMEZ-GRACIA	326
CORDOBA-INT. MED.	LOPEZ-MIRANDA	308
BARCELONA-INT. MED.	ESTRUCH	302
GRANADA-EPI	A. BUENO-CAVANILLAS	296
VITORIA-CARDIOLOGY	AROS	274
BALEARIC-PHYSIOLOGY	TUR	270
MALAGA-ENDOCRINOL.	TINAHONES	268
CANARY I.- EPIDEMIOLOGY	SERRA-MAJEM	266
LEON-PRIMARY CARE	MARTIN	258
SEVILLA-PRIMARY CARE	LAPETRA	232
MADRID-ENDOCRINOL.	VAZQUEZ	230
BARCELONA-INT. MED.	PINTÓ	207
BARCELONA-ENDOCRINOL	VIDAL	205
MADRID-NUTRITION	ORDOVAS	169
JAEN-EPI	DELGADO-RODRIGUEZ	152
MADRID-ENDOCRINOL.	RUBIO	124
		6874

CURRENT PERIOD OF FOLLOW-UP (years) as of Oct 1, 2019	
Mean follow-up	3.75 (SD: 0.75)
Median follow-up	3.55
p25 – p75	3.16 – 4.33
Minimum	2.75
Maximum	5.92

P-Y accrual > 25,000

EXPECTED END OF INTERVENTION (6 y from randomization)	
Mean date	Dec 23, 2021
Median	March 7, 2022
p25 – p75	May 26,2021 – Jul 26,2022
Minimum	Oct 23, 2019
Maximum	Dec 23, 2022

17-item screener

negociated goals for the intervention group

1. Olive oil main culinary fat
2. Vegetables ≥ 2 /d
3. Fruits ≥ 3 /d
4. Red/processed meats ≤ 1 /wk
5. Butter, margarine, cream < 1/wk
6. Sugary beverages < 1 /wk
7. Legumes ≥ 3 /wk
8. Fish / seafood ≥ 3 /wk

Energy-reduced MedDiet

9. Bakery, cookies, sweets < 2 /wk
10. Tree nuts ≥ 3 /wk
11. Poultry > red-processed meats
12. Sofrito ≥ 2 /wk
13. Not adding sugar to beverages
14. White bread ≤ 1 /d
15. Whole grains ≥ 5 /wk
16. Refined grains-rice-pasta < 3 /wk
17. Wine glasses: men 2-3 /d
    women 1-2 /d

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Interim Analysis of the PREDIMED-Plus Randomized Clinical Trial

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Table 2. Baseline Dietary Pattern Scores and Changes by Randomized Treatment Group in a Study of the Effect of an Energy-Reduced Mediterranean Diet Among Patients With Metabolic Syndrome on Diet Adherence

	Multiple Imputation: All Randomized Included Participants[a]			
Dietary Pattern Score	Intervention Group (Energy-Reduced Mediterranean Diet; n = 3272)	Control Group (Mediterranean Diet; n = 3311)	Between-Group Difference (95% CI)[b]	*P* Value
17-Item er-MedDiet[c]				
Baseline, mean (SD)	8.5 (2.6)	8.6 (2.7)		
6 Months				
Score	12.9 (2.8)	10.8 (2.8)		
Score change	4.4 (3.4)	2.2 (3.5)	2.2 (2.0 to 2.3)	<.001
12 Months				
Score	13.2 (2.7)	11.1 (2.8)		
Score change	4.7 (3.5)	2.5 (3.4)	2.2 (2.1 to 2.4)	<.001

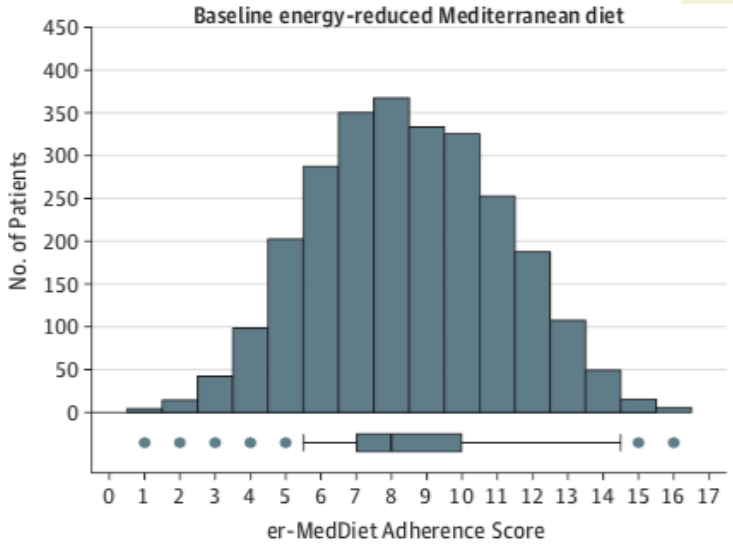
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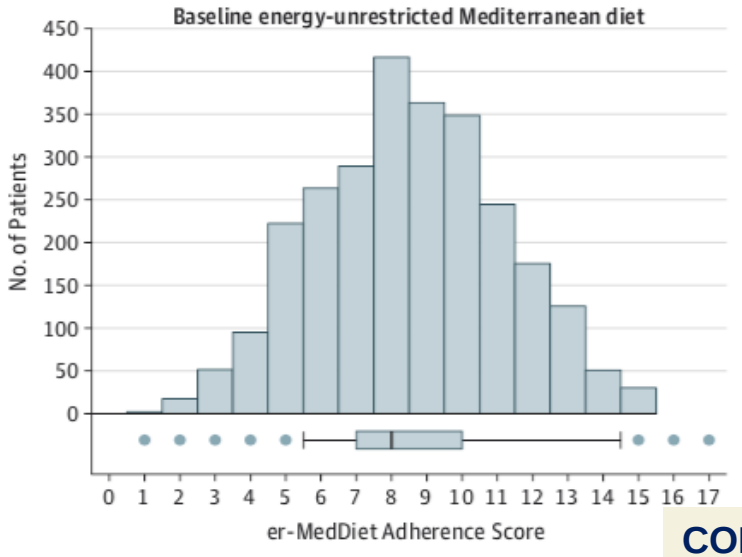
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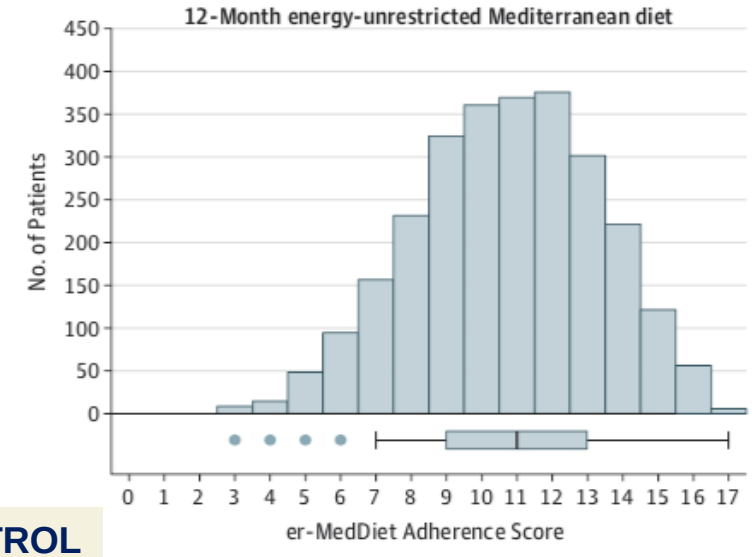
EFFECTIVENESS OF THE DIETARY INTERVENTION

Figure 2. Changes in the Primary End Point in a Study of the Effect of an Energy-Reduced Mediterranean Diet (er-MedDiet) Among Adults With Metabolic Syndrome

INTERVENTION





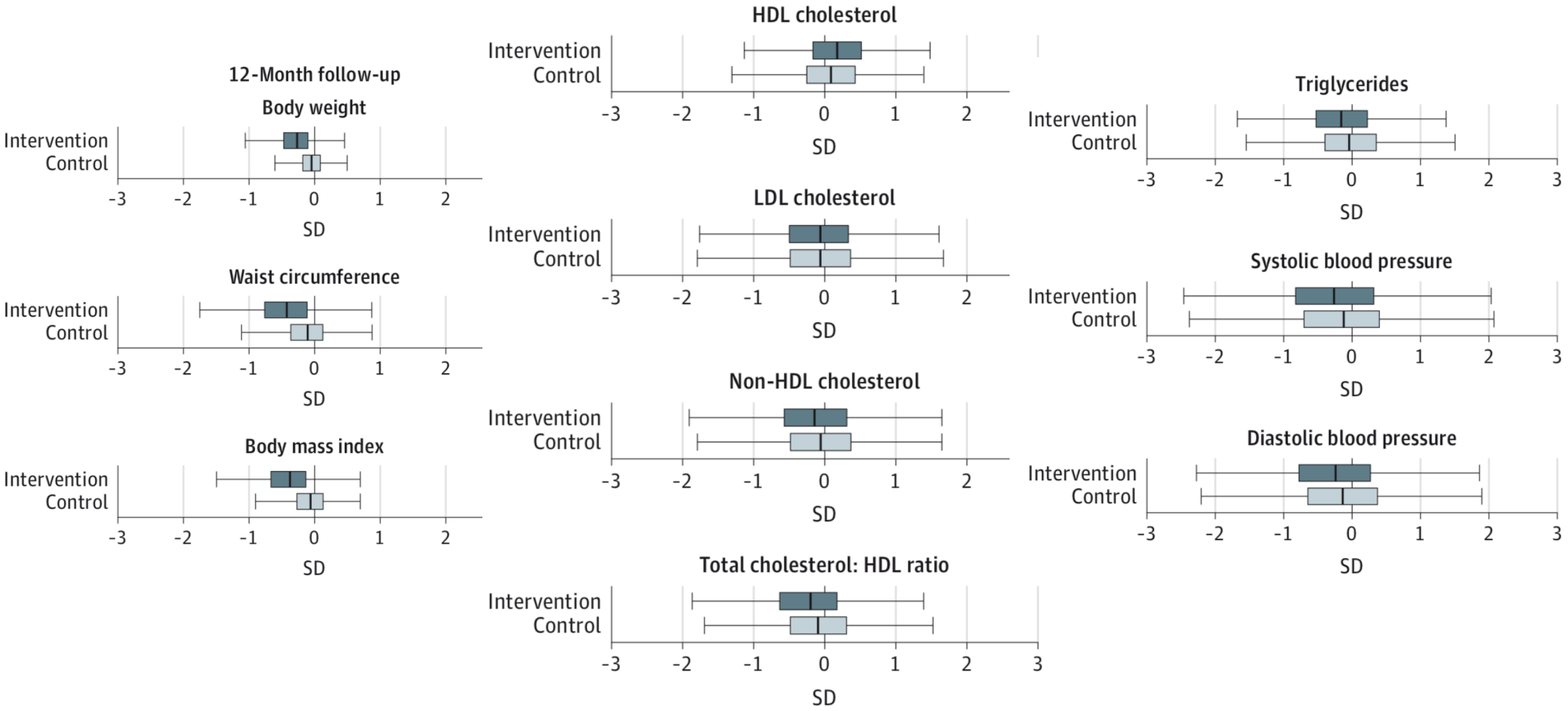


CONTROL

Horizontal box plots are shown in which the middle line represents the median er-MedDiet score (range, 0-17; higher score indicates higher adherence), boxes represent the interquartile range (IQR), whiskers extend to the most extreme observed values with 1.5 × IQR of the nearer quartile, and the dots represent observed values outside that range.

Sayón-Orea et al. JAMA 2019;322:1486-99

12-MO CHANGES IN RISK FACTORS



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