Dietary Fat and Health: Lessons from Greece and Beyond

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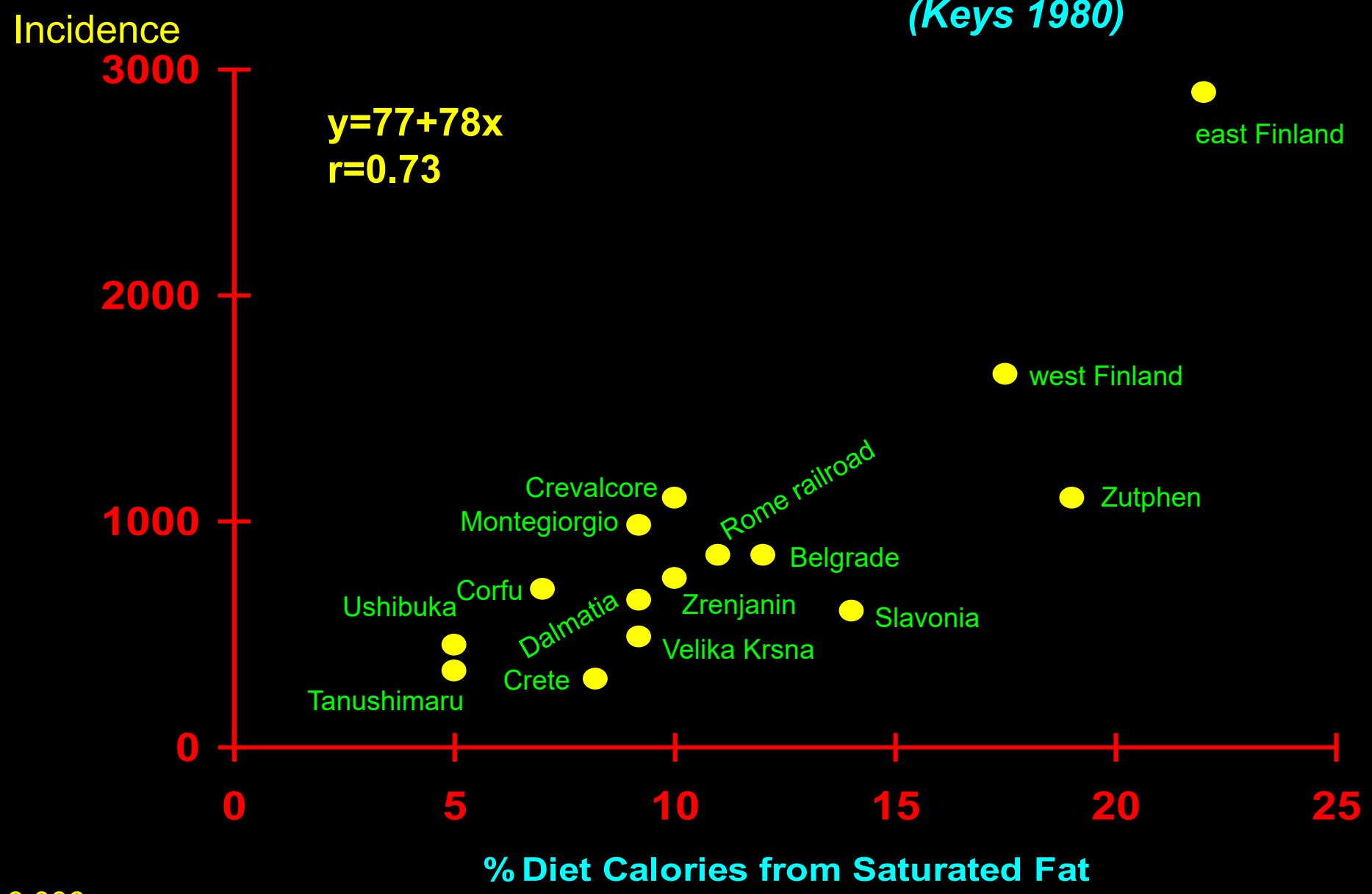
October 3, 2016

10-Year Coronary Incidence Per 10,000 Men

(Keys 1980)



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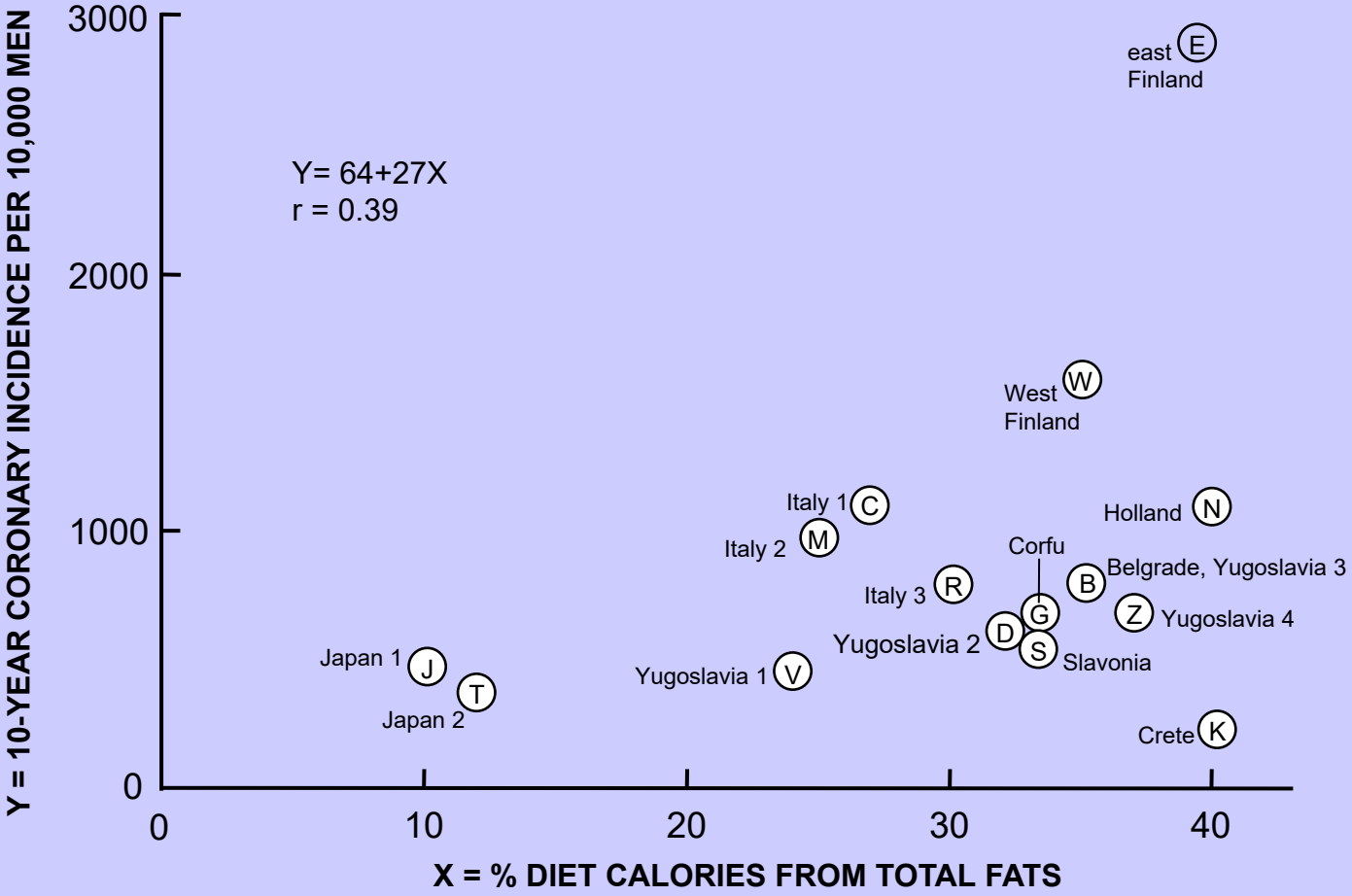
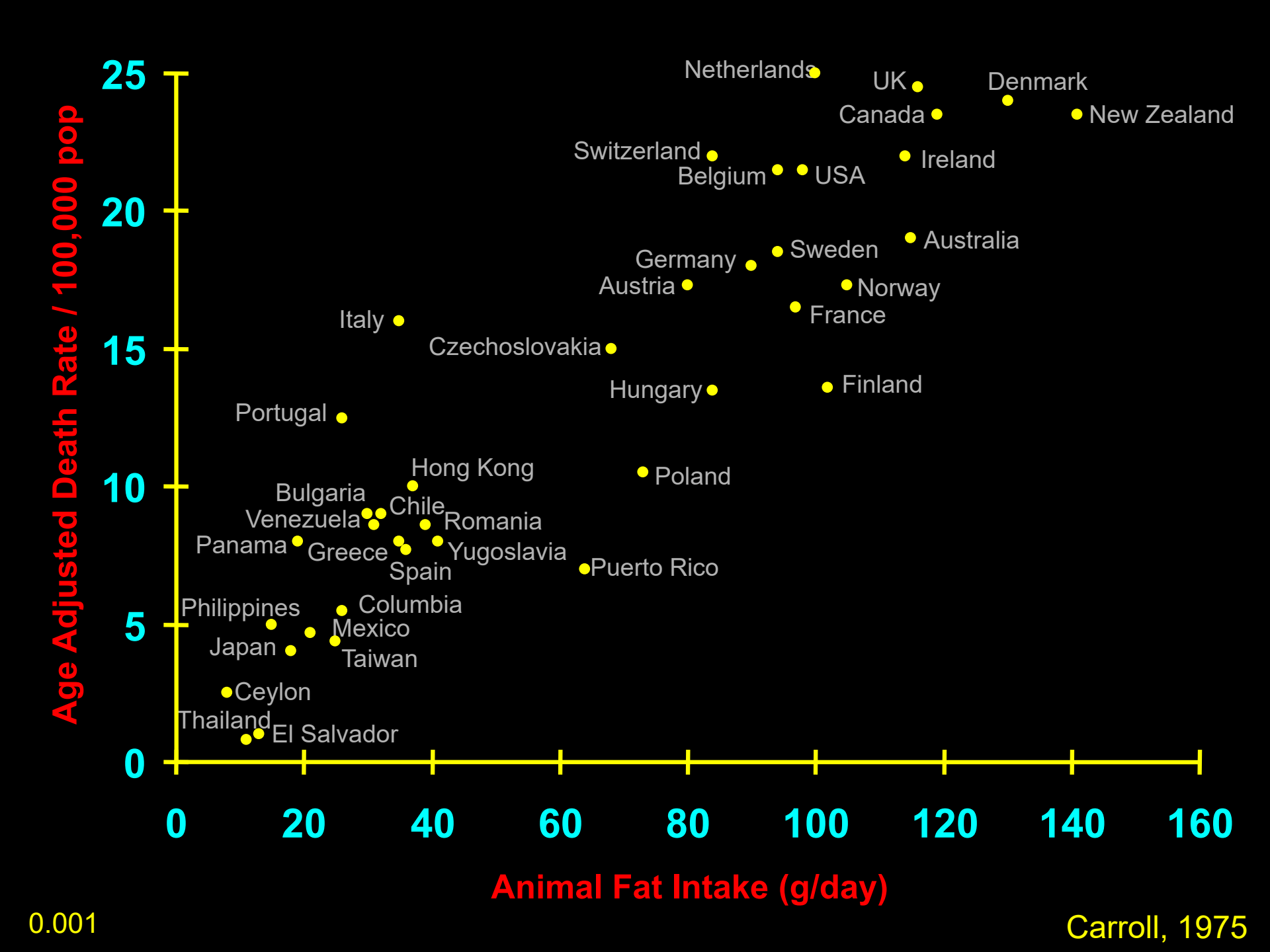


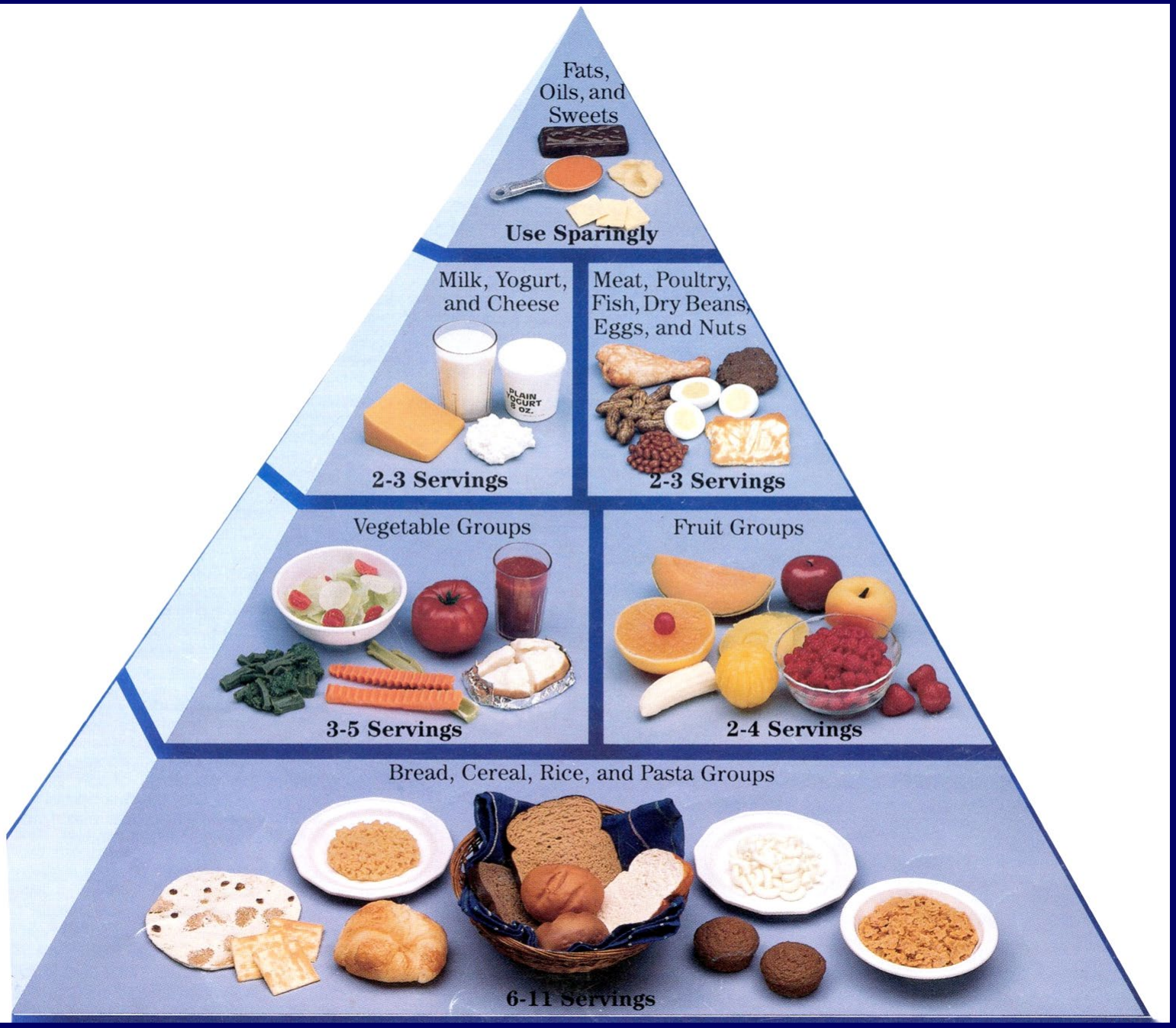
Ten-year incidence rate of coronary heart disease, by any diagnostic criterion, plotted against the percentage of dietary calories supplied by total fats.
(Keys, 1980)

Life expectancy and disease rates in the United States, Greece and Japan in the 1960s

Life expectancy and disease rates		United States	Greece	Japan
Life expectancy at age 45 (years)	(M)	27	31	27
Coronary heart disease	(M)	189	33	34
Cerebrovascular diseases	(M)	30	26	102
Breast cancer	(F)	22	8	4
Stomach cancer	(M)	6	10	48
Colorectal cancer	(M)	11	3	5
Total cancers	(M)	102	83	98

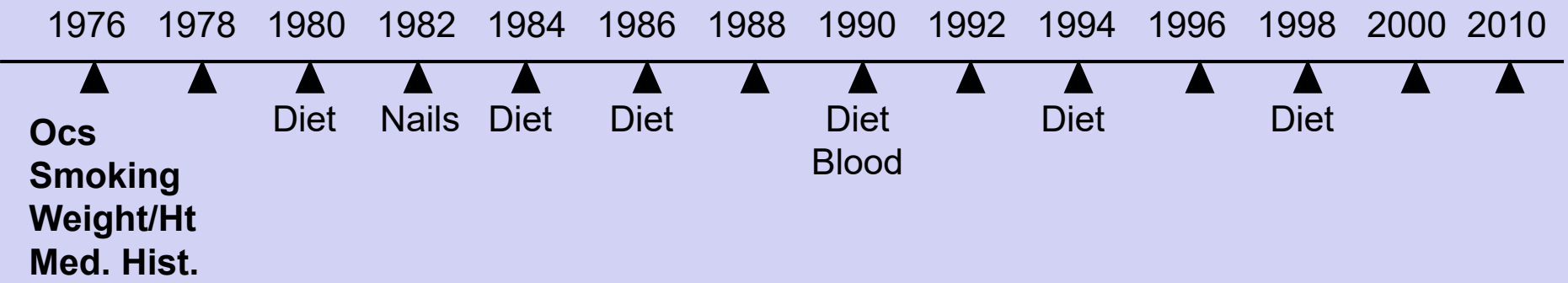
(Willett WC, Science, 1994)


Age Adjusted Death Rate / 100,000 pop
25
20
15
10
5
0
Netherlands
UK
Denmark
Canada
New Zealand
Switzerland
Ireland
Belgium
USA
Australia
Germany
Sweden
Austria
Norway
France
Italy
Czechoslovakia
Hungary
Finland
Portugal
Hong Kong
Poland
Bulgaria
Chile
Venezuela
Romania
Panama
Greece
Yugoslavia
Spain
Puerto Rico
Philippines
Columbia
Mexico
Japan
Taiwan
Ceylon
Thailand
El Salvador
0
20
40
60
80
100
120
140
160
Animal Fat Intake (g/day)
0.001
Carroll, 1975

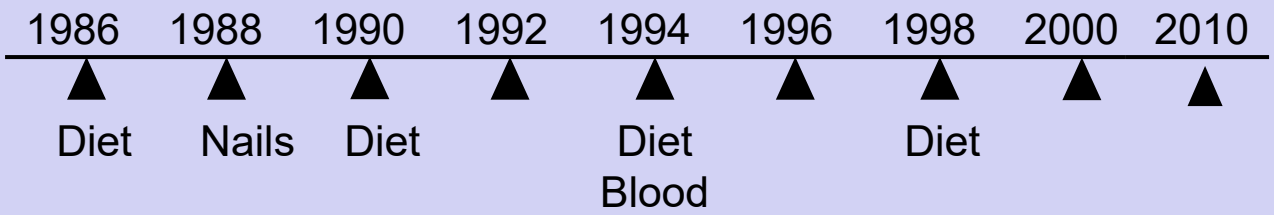

Fats, Oils, and Sweets
Use Sparingly
Milk, Yogurt, and Cheese
2-3 Servings
Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts
2-3 Servings
Vegetable Groups
3-5 Servings
Fruit Groups
2-4 Servings
Bread, Cereal, Rice, and Pasta Groups
6-11 Servings

21.031

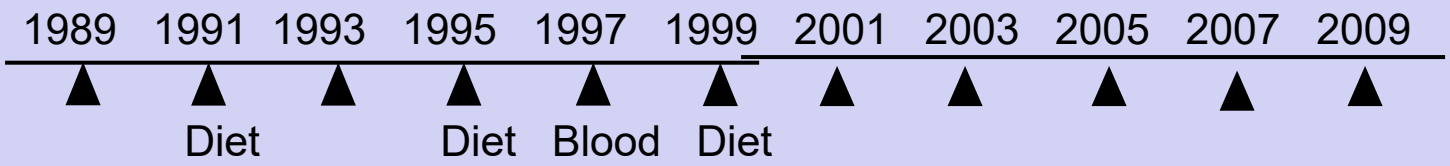
Nurses' Health Study (n=121,700)



Health Professionals Follow-up Study (n=52,000)



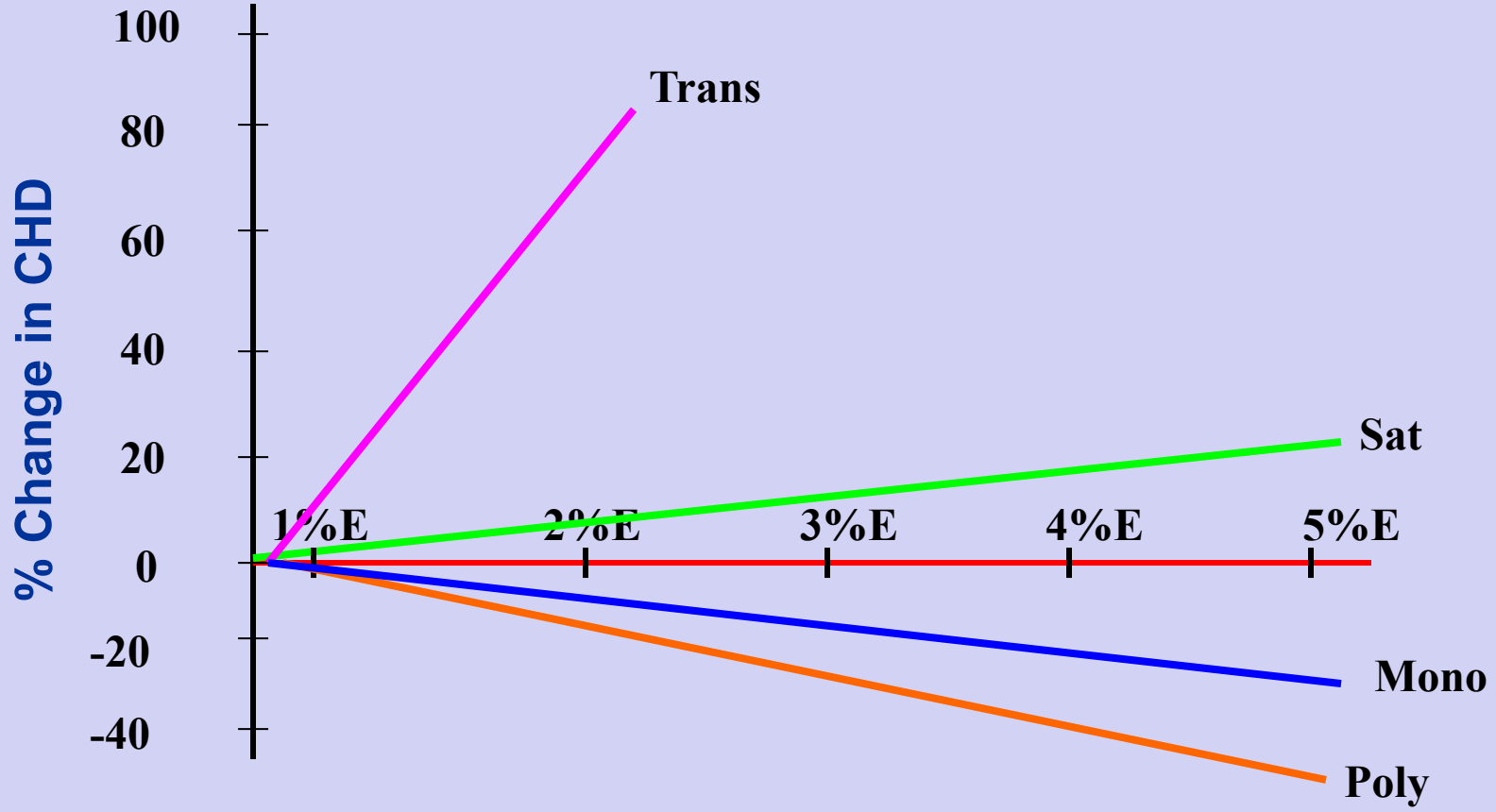
Nurses' Health Study II (n=116,000)



Investigators: ***Frank Hu, Frank Speizer, Bernie Rosner, Meir Stampfer, Graham Colditz, David Hunter, JoAnn Manson, Sue Hankinson, Eric Rimm, Edward Giovannucci, Alberto Ascherio, Gary Curhan, Charlie Fuchs, Fran Grodstein, Michelle Holmes, Frank Hu, Donna Spiegelman***

0.198a

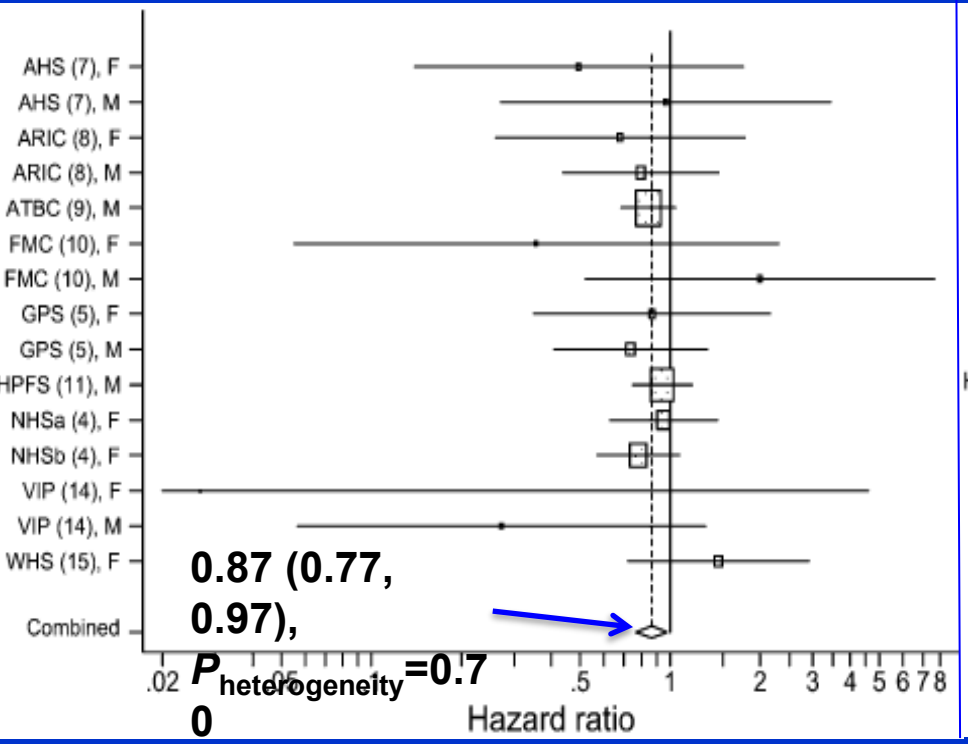
Type of Dietary Fat and Risk of Coronary Heart Disease
The Nurses' Health Study
14-Year Follow-up



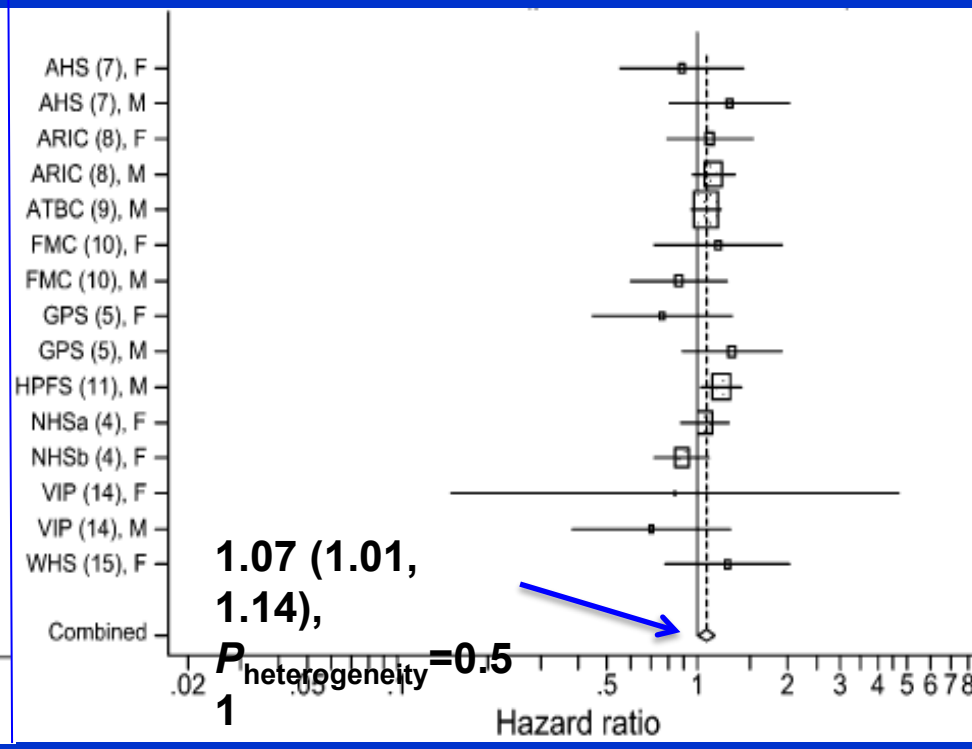
Hu FB, et al. N Engl J Med 1997;337:1491-9

Coronary Events, per 5 E% increments

PUFAs for SFAs

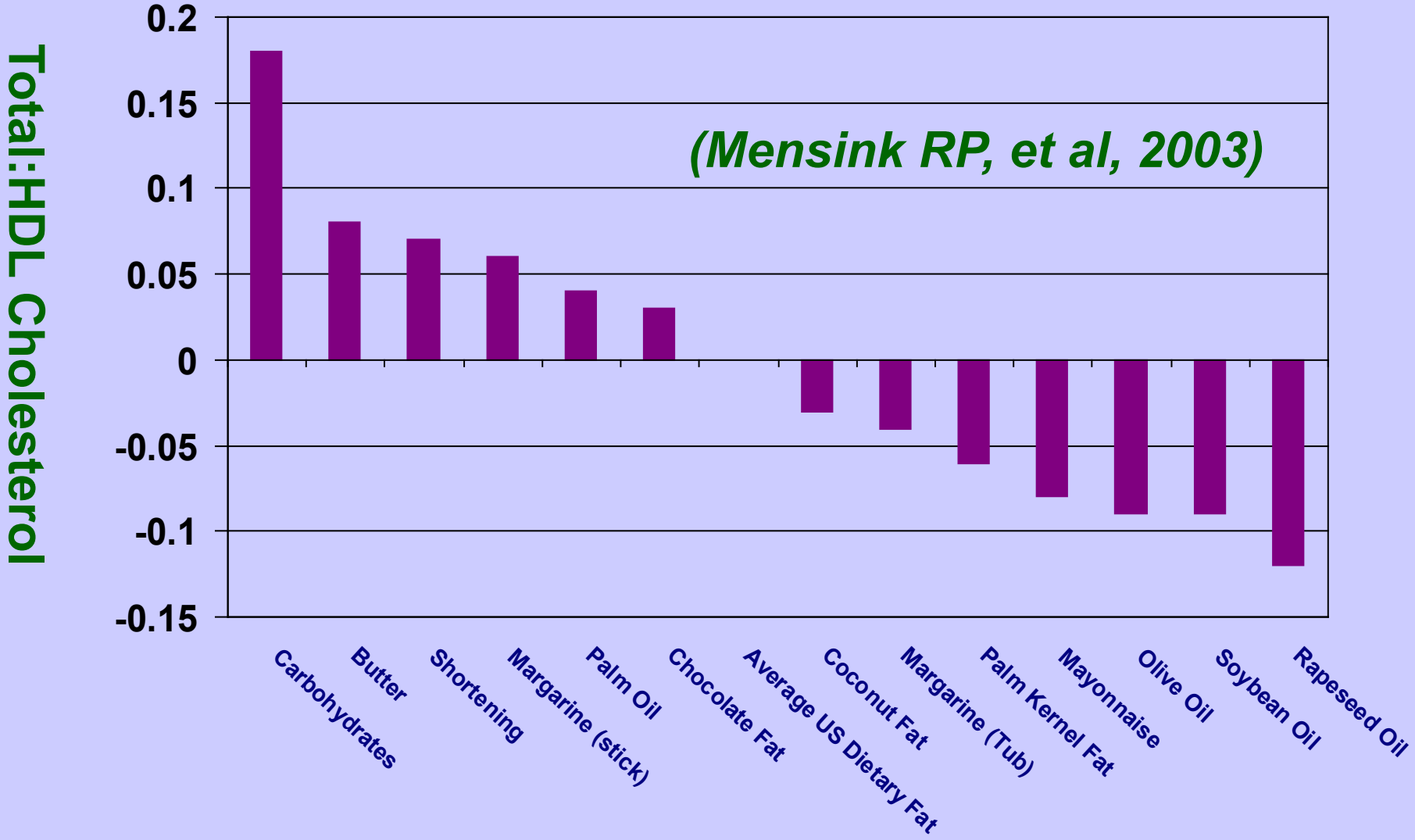


Carbs for SFAs



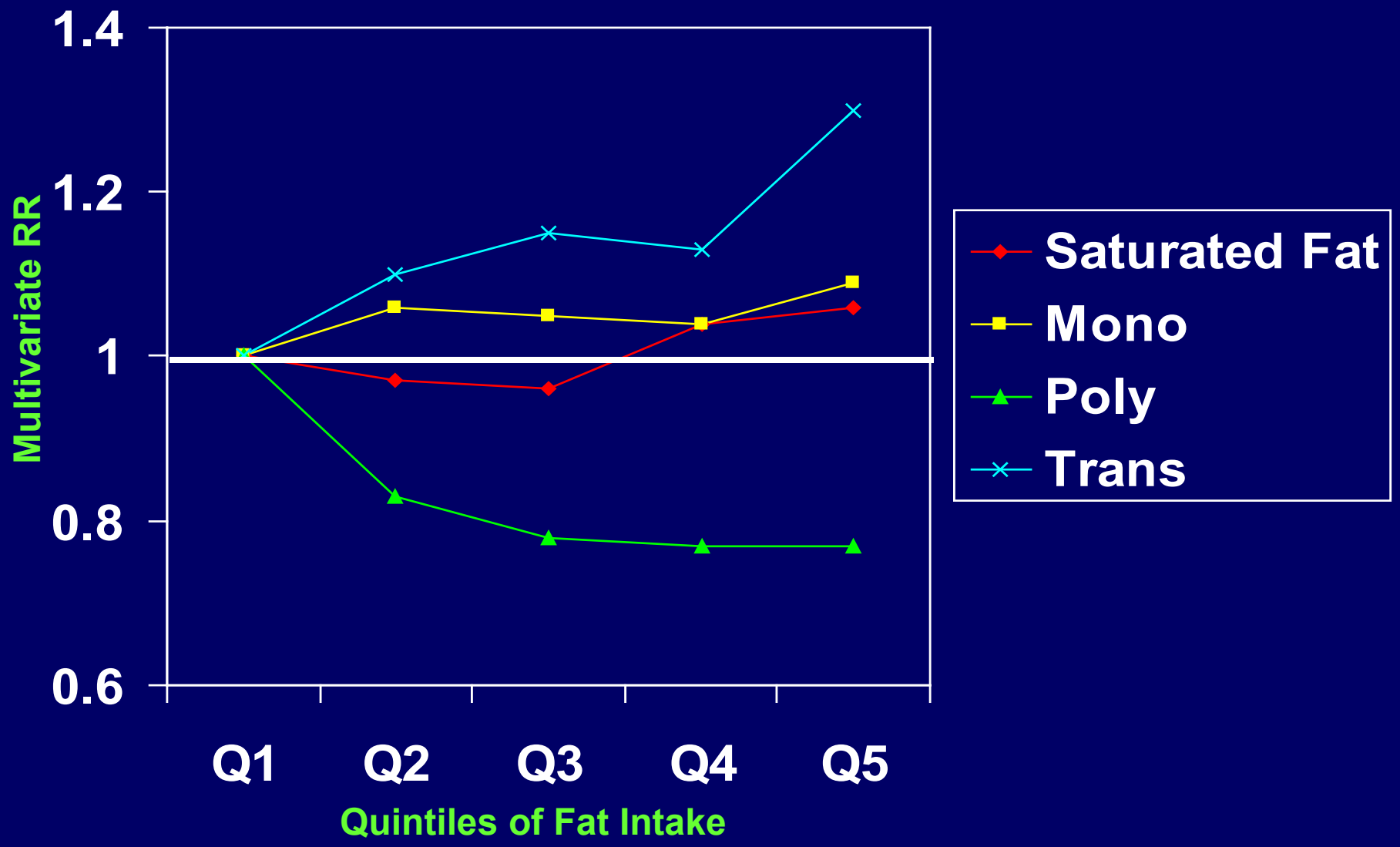
The model included intake of MUFA, PUFA, trans-fatty acids, CHs, protein expressed as percentage, TEI, smoking, BMI, physical activity, highest attained educational level, alcohol intake, history of hypertension, and energy-adjusted quintiles of fiber intake (g/d) and cholesterol intake (mg/d)

(Jakobsen MU, et al. AJCN, 2009)



Mensink RP, Katan MB. Am J Clin Nutr 2003;77(5):1146-55

Multivariate RR's of type 2 diabetes according to quintiles of specific types of dietary fat (mutually adjusted)



Salmeron et al. Am J Clin Nutr 2001;73(6):1019-26.

25.004

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JUNE 26, 2003 VOL. 348 NO. 26

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.

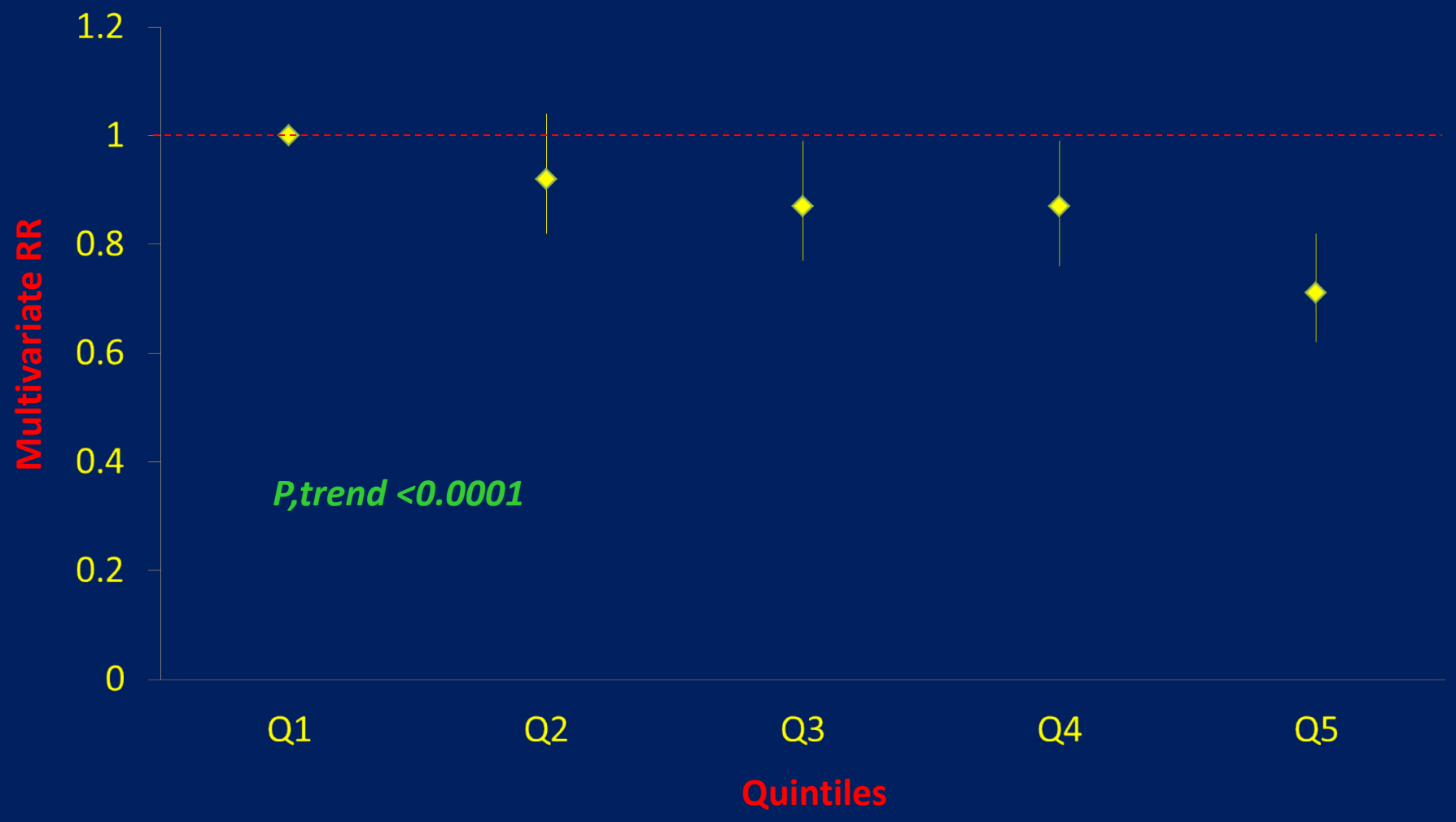
Hazard Ratios for Death Associated with a Two-Point Increment in the Mediterranean-Diet Score

(9-point scale)

Variable	# Deaths/ # Participants	Hazard Ratio for Death (95%CI)	
		Age- and Sex-Adjusted	Fully Adjusted
Death from any cause	275/22,043	**0.79** (0.69-0.91)	**0.75** (0.64-0.87)
Death from coronary heart disease	54/22,043	**0.74** (0.54-1.02)	**0.67** (0.47-0.94)
Death from cancer	97/22,043	**0.85** (0.67-1.08)	**0.76** (0.59-0.98)

(Trichopoulou A. et al, 2003)

Mediterranean Diet Score and Risk of CHD in NHS

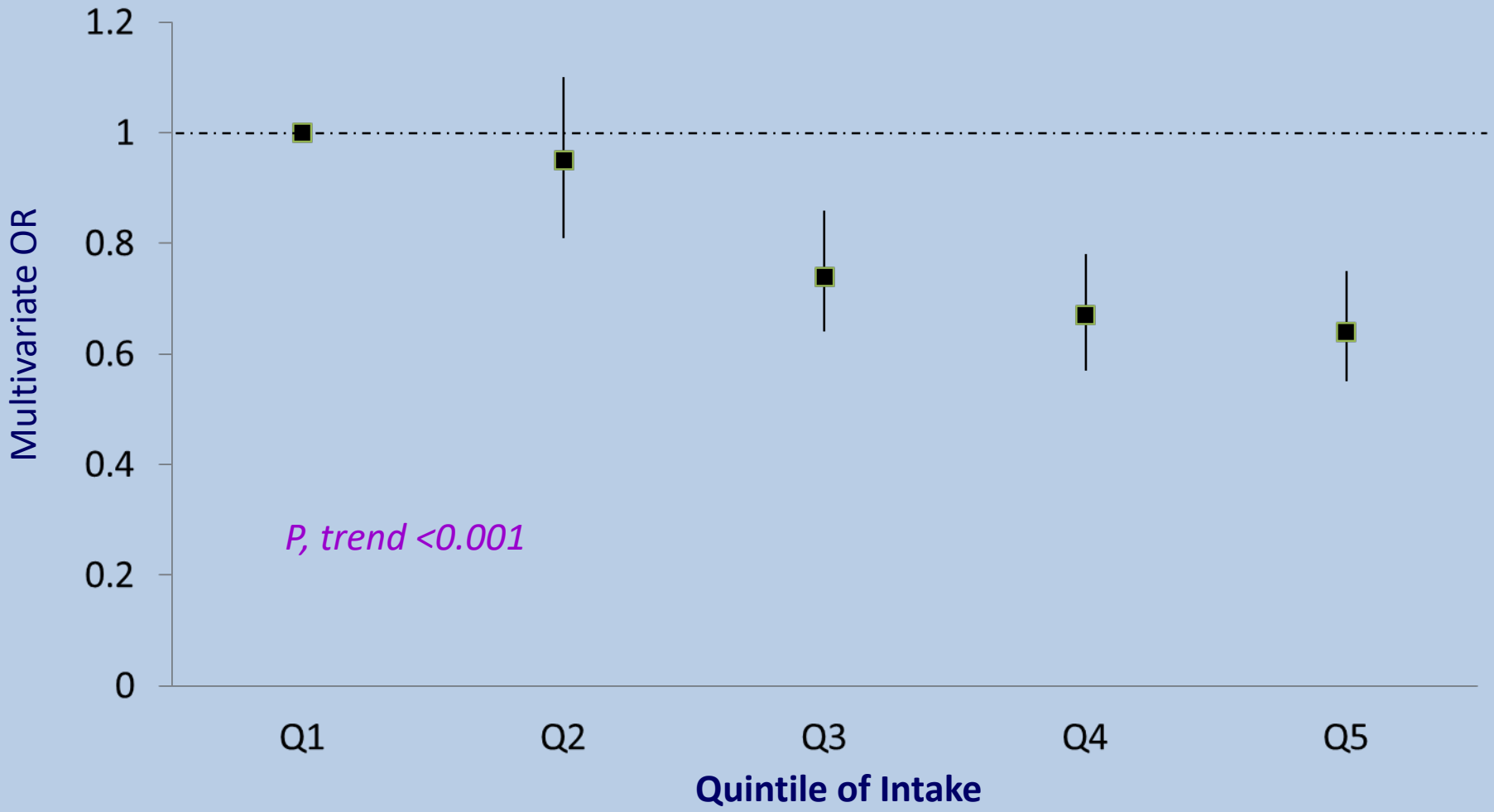


Fung TT, Rexrode KM, Mantzoros CS, Manson JE, Willett WC, Hu, FB, (Circulation 2009)

28.047

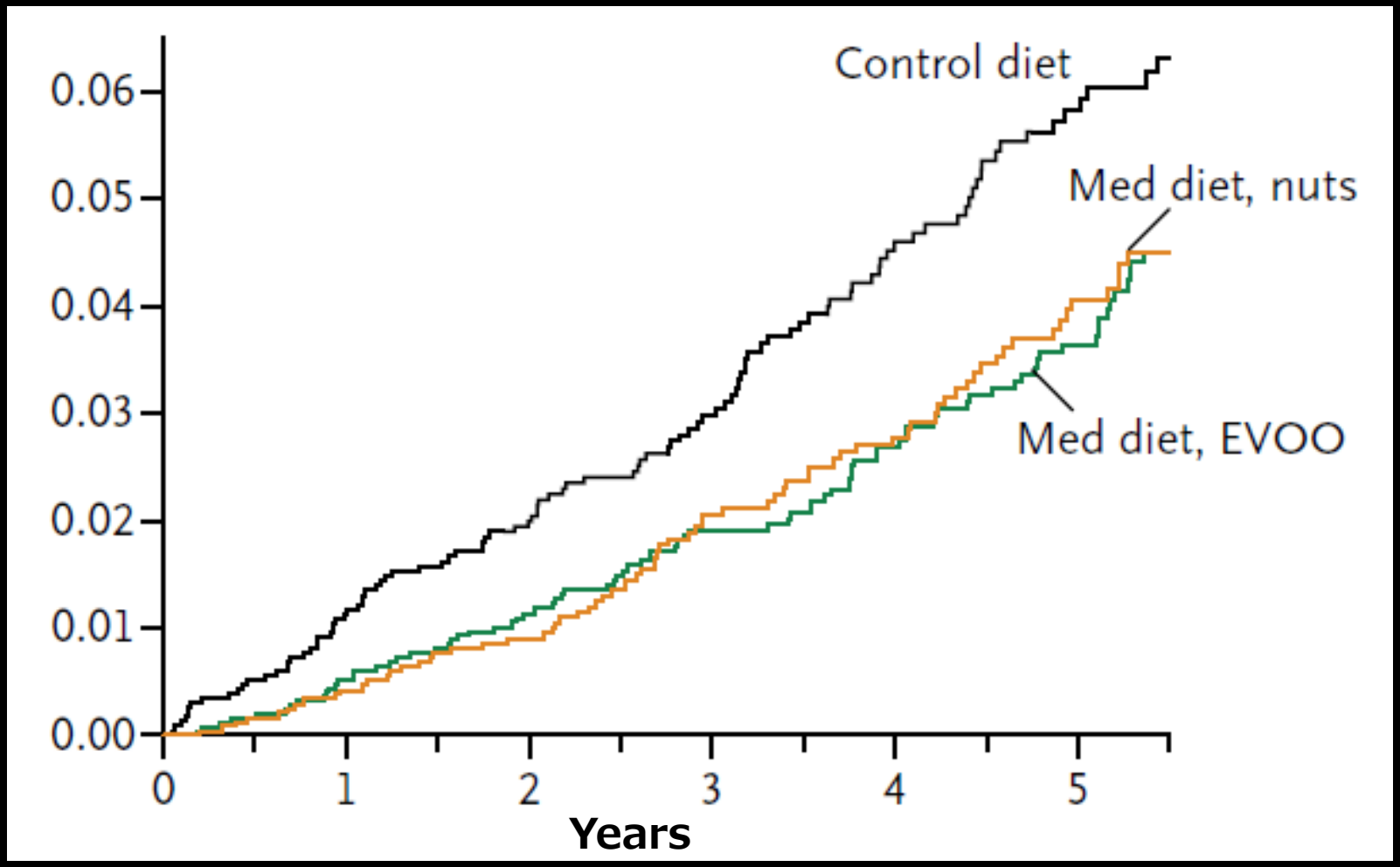
Multivariate Odds Ratios (95% CI) for Subjective Cognitive Decline According to Quintile of the Mediterranean Diet Score

(N=27, 406 men followed for 26 years)



(Bhushan A et al., unpublished data)

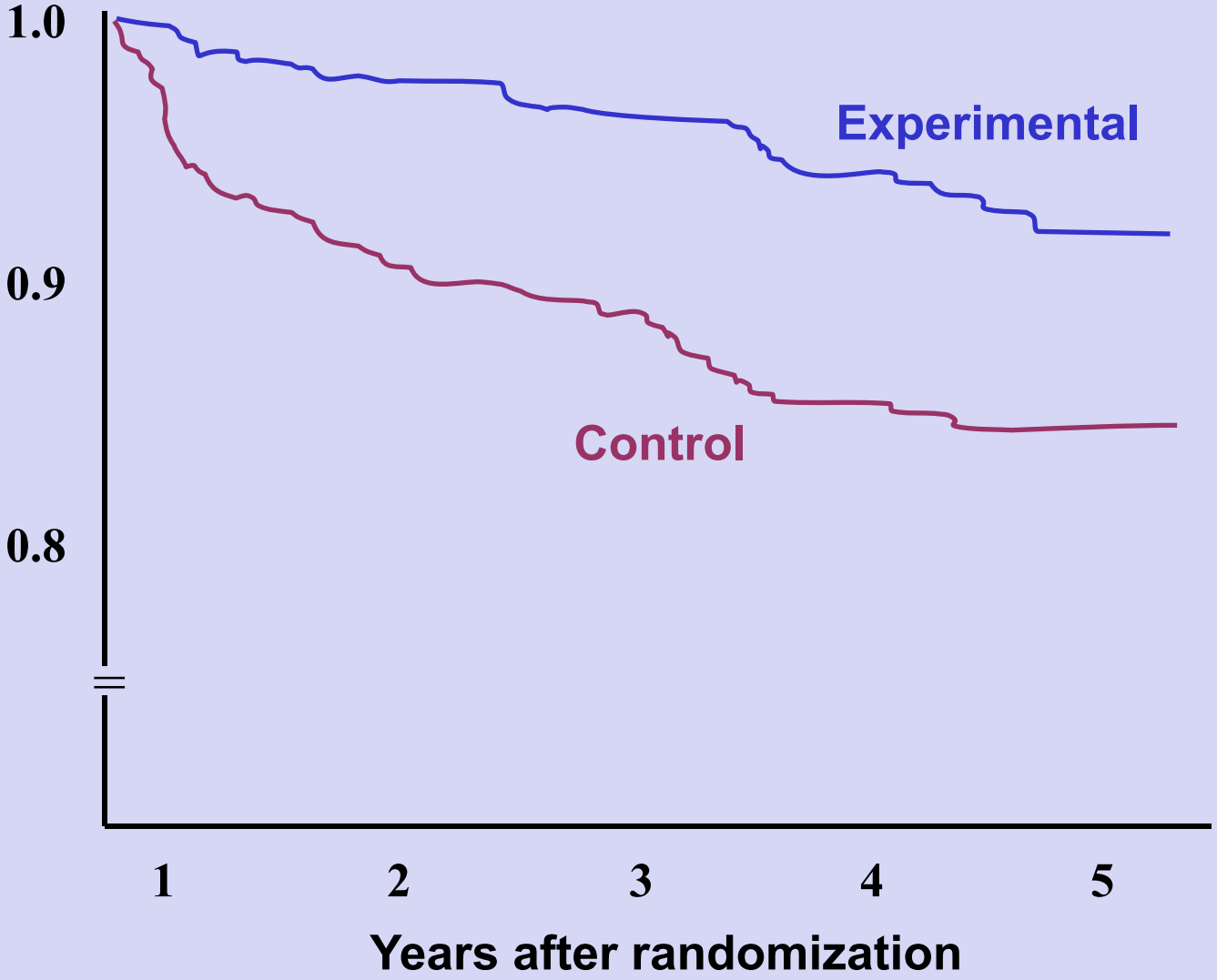
Kaplan-Meier Estimates of the Incidence of Outcome Events in the Total Predimed Study Population



(Estruch R et al. NEJM 2013)

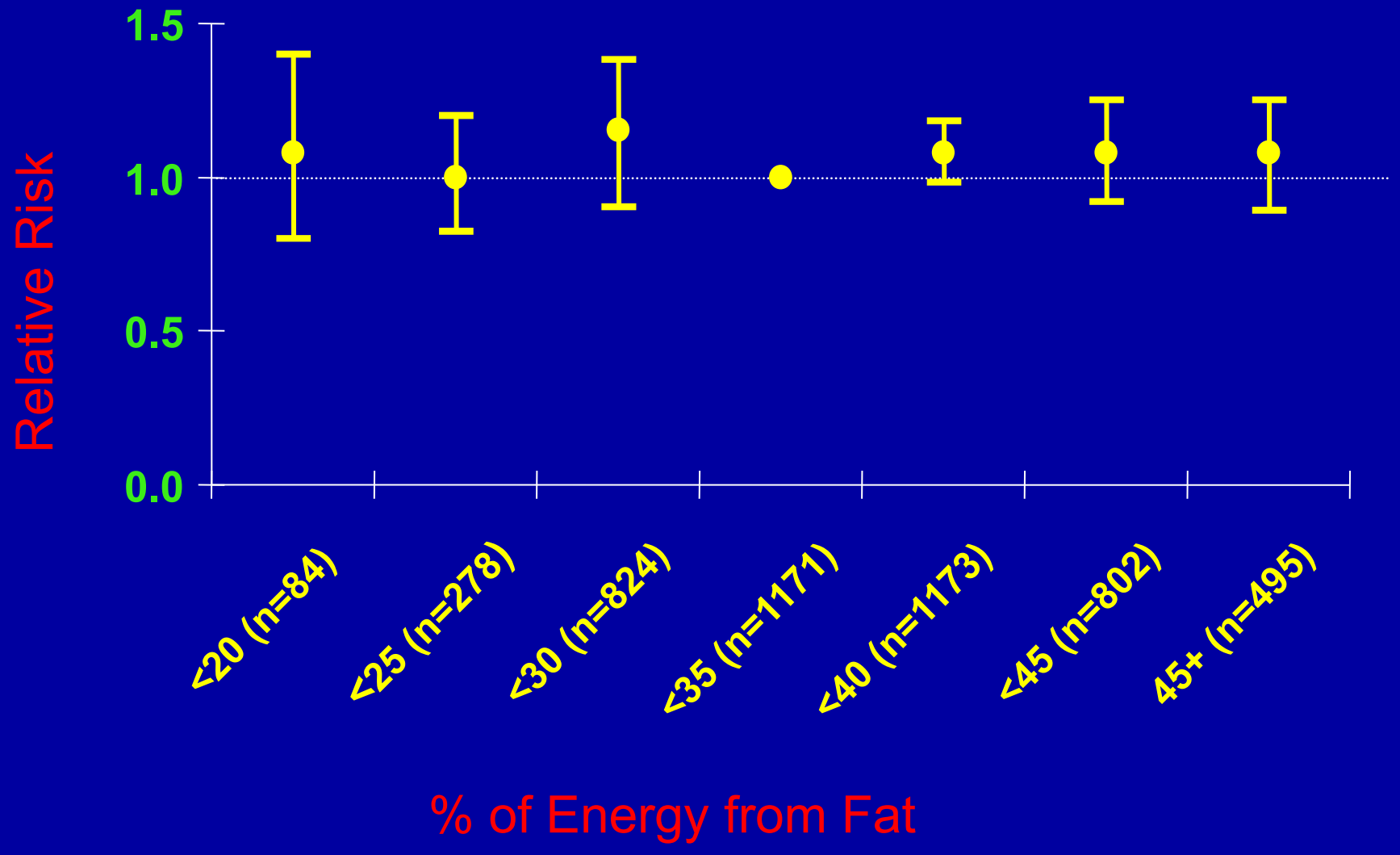
Cardiac Deaths and Non-Fatal AMI

(Lyon Heart Study)



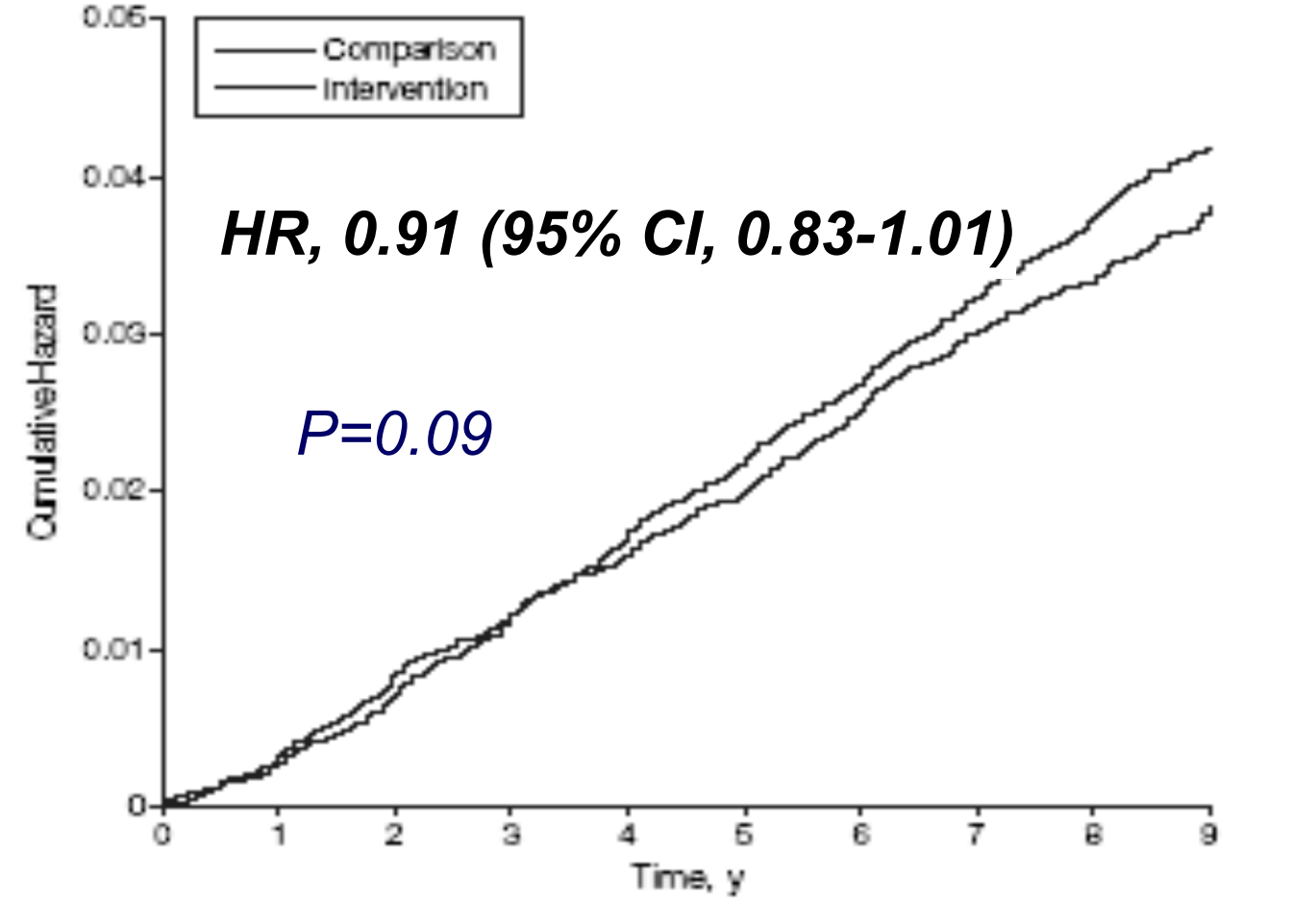
(De Lorgeril et al.)

Total Fat Intake and Breast Cancer



(Hunter D et al. 1996)

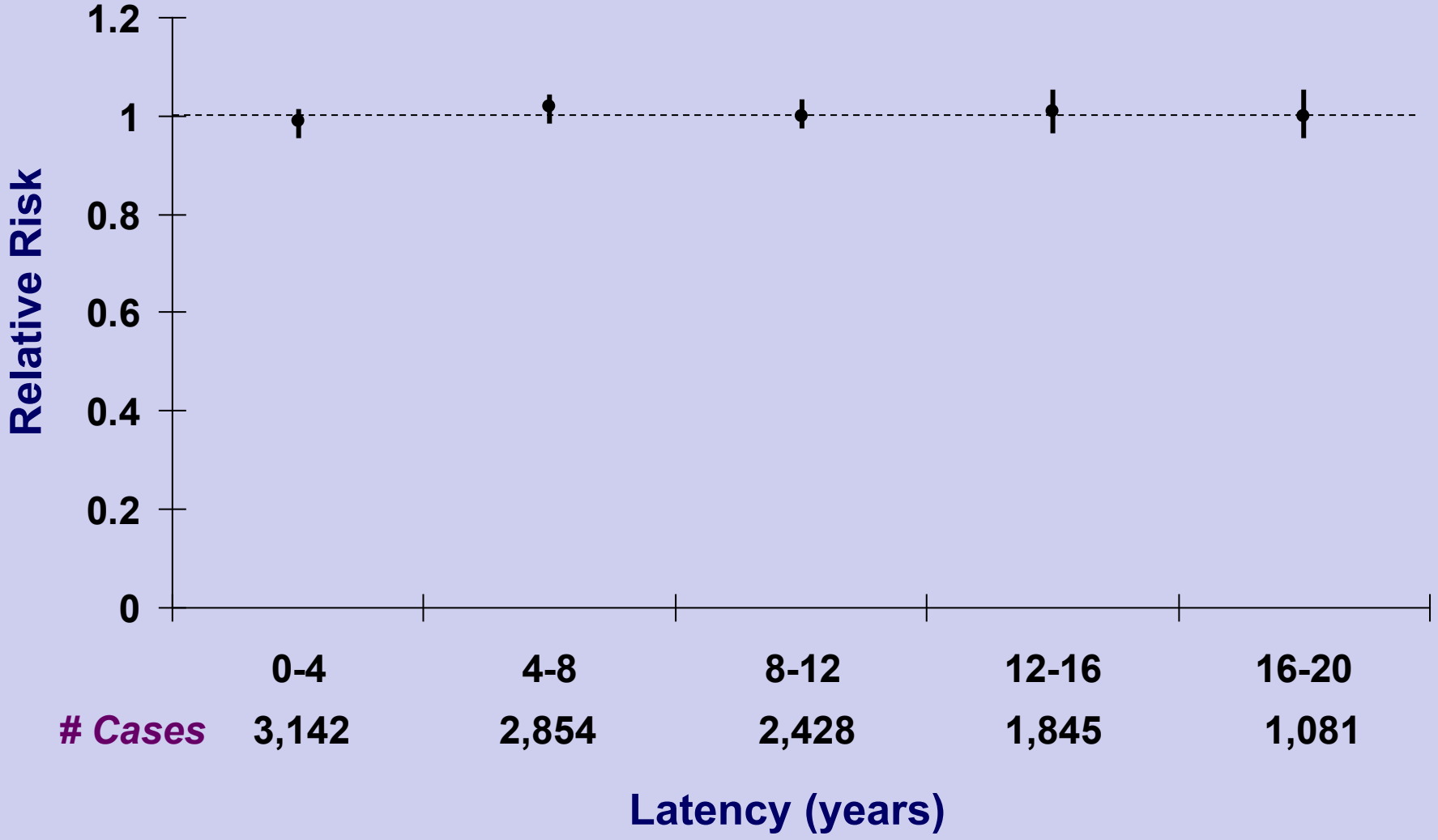
Breast Cancer Incidence in WHI



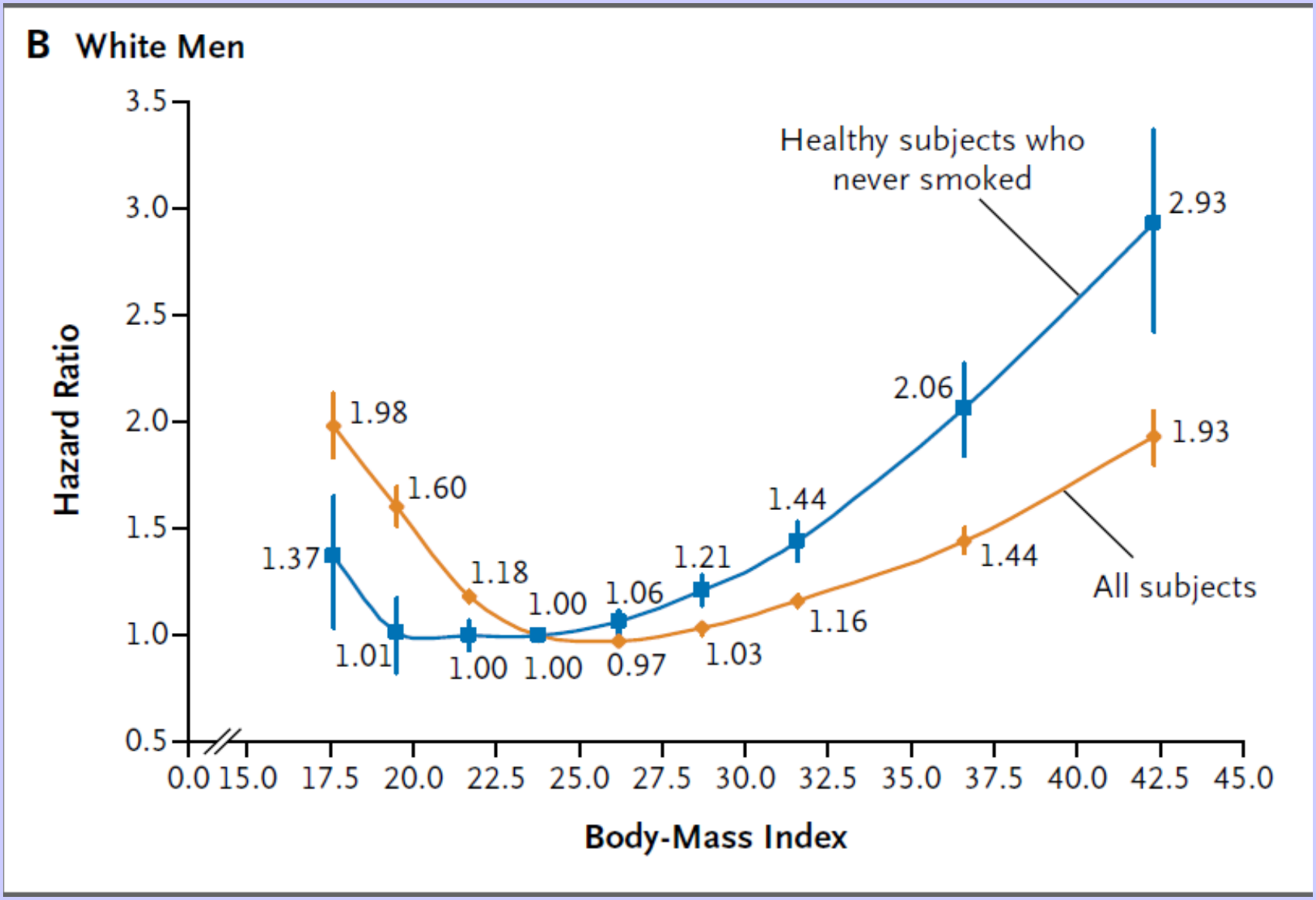
(Prentice et al. 2006)

Multivariate RR of Breast Cancer Among 80,376 Postmenopausal Women for a 5% Energy Increment

(Kim E, 2006)

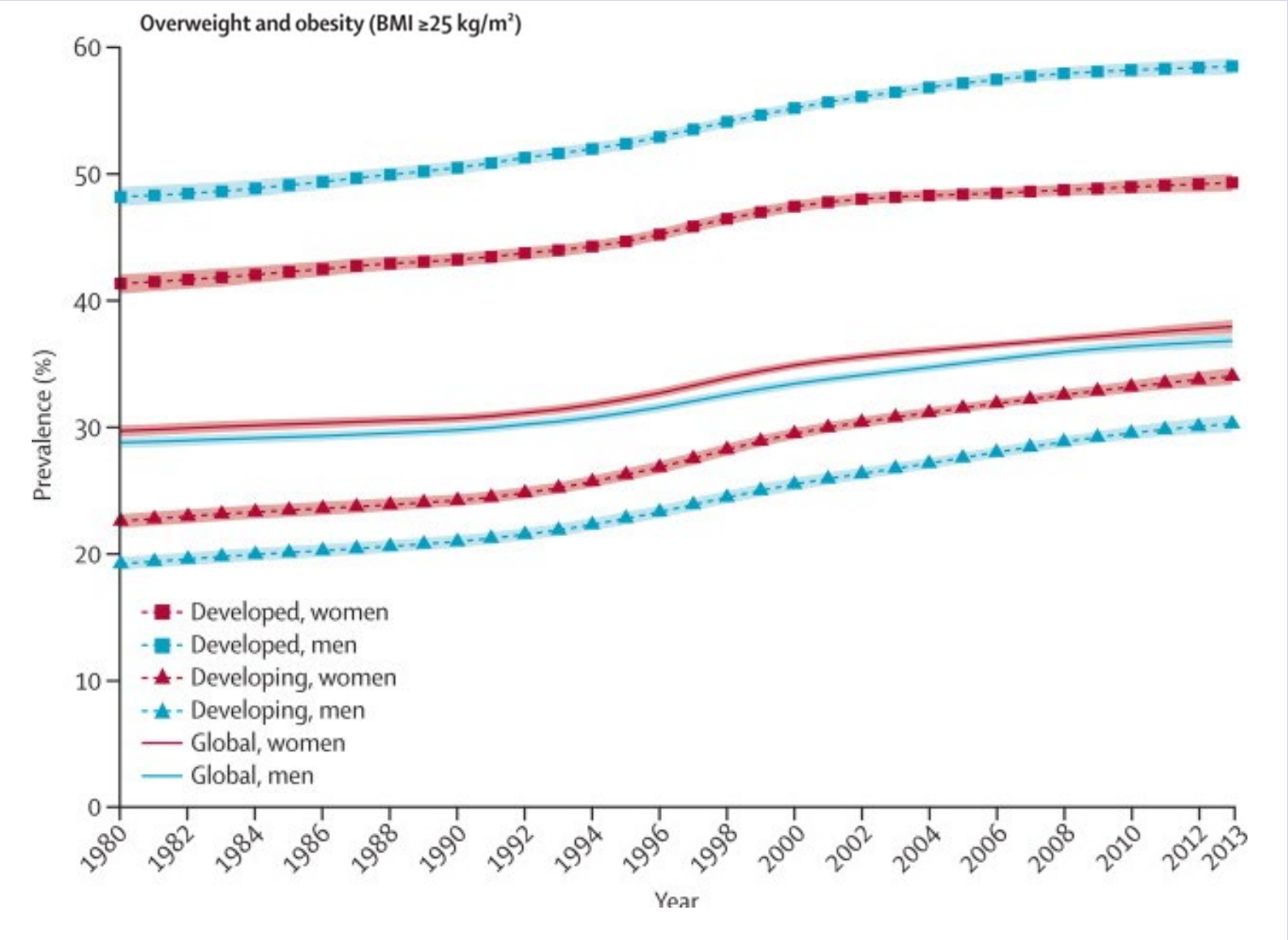


Estimated hazard ratios for death from any cause according to BMI for all study participants and for healthy subjects who never smoked



(Berrington de Gonzalez et al, NEJM, 2010)

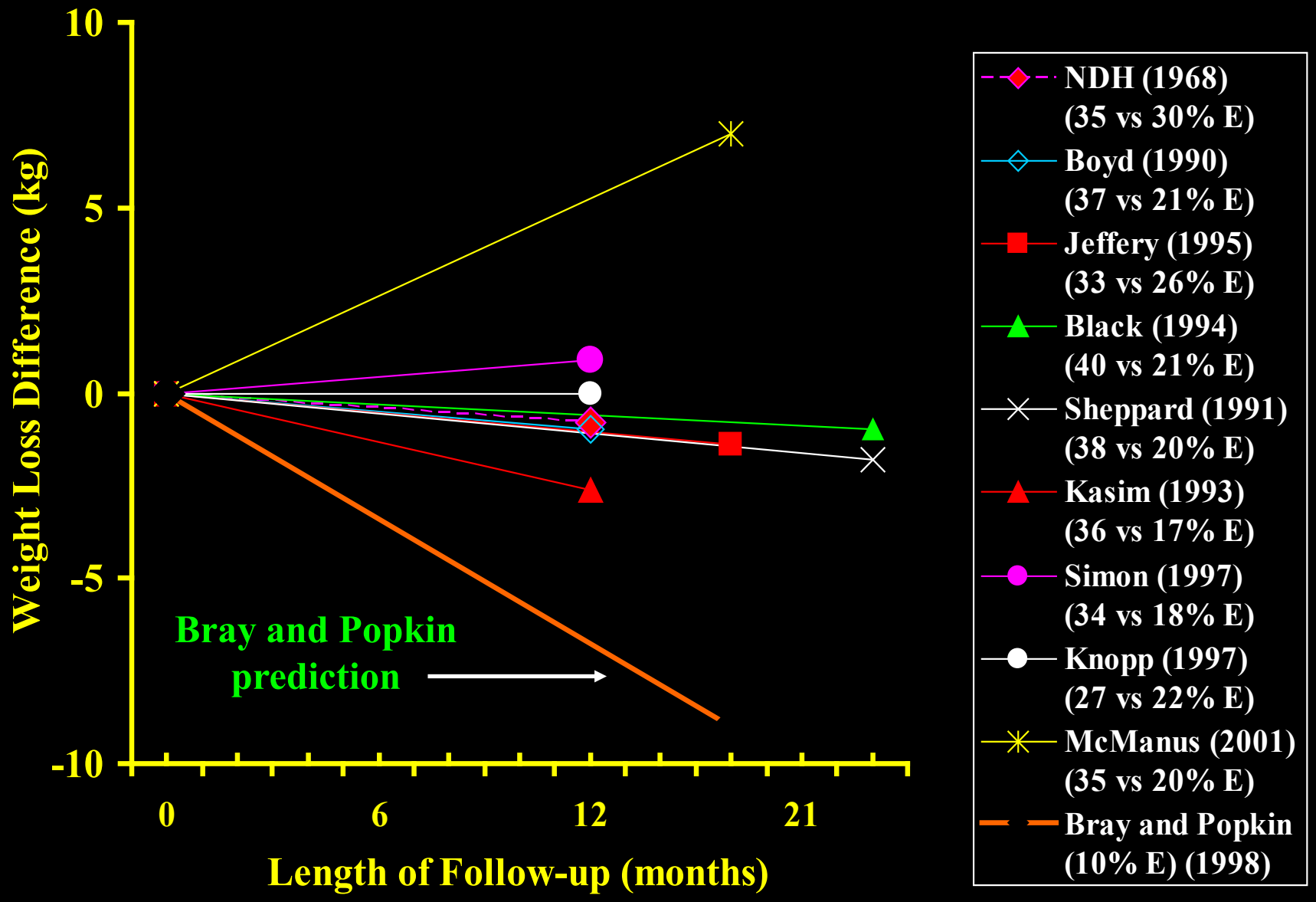
Changes in Prevalence of Overweight/Obesity from 1980 to 2012



29.540

Ng, M, Lancet, 2014

Low-Fat Weight Loss Trials



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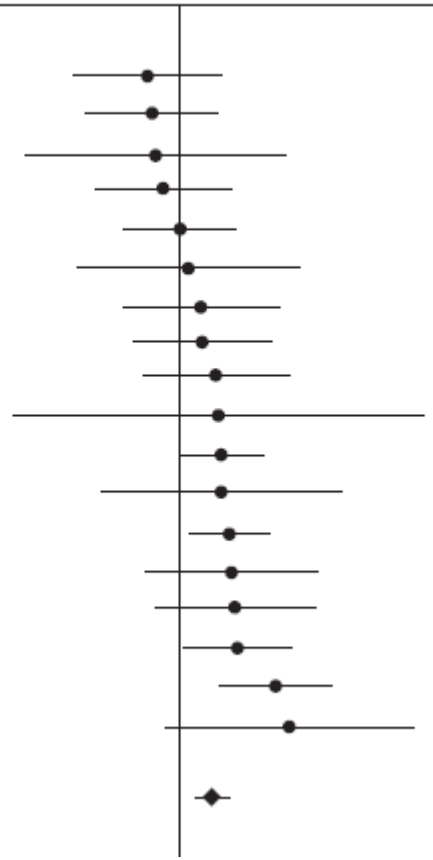
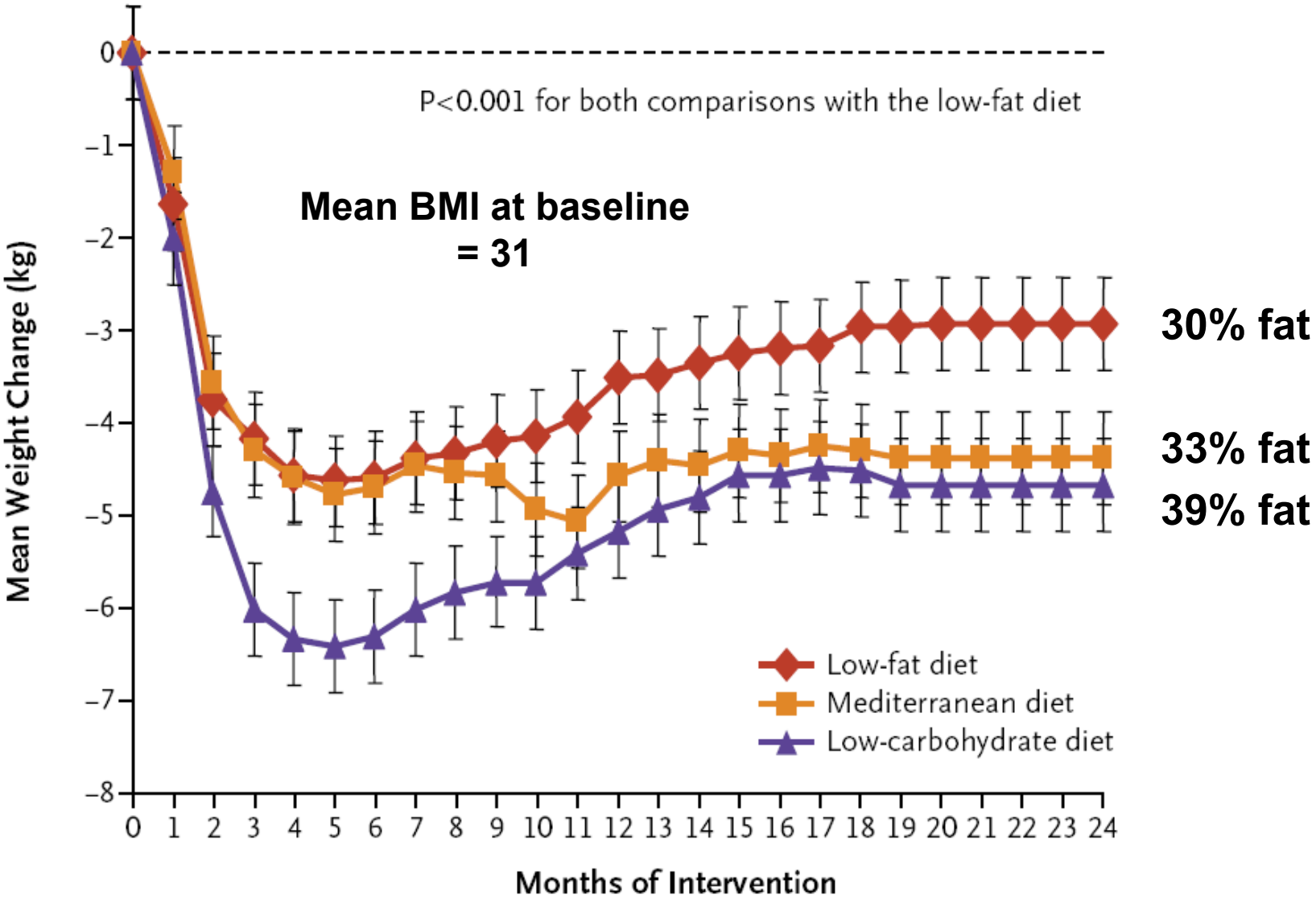
Dietary Fat and Weight Loss: Meta-analysis of 53 Randomized Trials 12+ Months (Equal Intensity Intervention)

Weight loss goal	Weight of study (%)	WMD (95% CI), kg	
Low-fat vs low-carbohydrate intervention			
Dansinger et al[42]	2·26	−1·20	(−3·91 to 1·51)
Foster et al[45]	2·38	−1·03	(−3·45 to 1·39)
Keogh et al[27]	1·49	−0·90	(−5·65 to 3·85)
Guldbrand et al[20]	2·34	−0·63	(−3·14 to 1·88)
Davis et al[16]	2·53	0·00	(−2·05 to 2·05)
Elhayany et al[18]	1·71	0·30	(−3·80 to 4·40)
Ebbeling et al[43]	2·20	0·76	(−2·11 to 3·63)
Lim et al[51]	2·33	0·80	(−1·74 to 3·34)
Iqbal et al[21]	2·27	1·30	(−1·38 to 3·98)
McAuley et al[52]	0·85	1·40	(−6·15 to 8·95)
SMART Study[58]	2·71	1·50	(−0·06 to 3·06)
Brinkworth/Tay et al[39,40]	1·60	1·50	(−2·93 to 5·93)
DIRECT[37]	2·74	1·80	(0·34 to 3·26)
Foster et al[44]	2·08	1·89	(−1·28 to 5·05)
Stern/Samaha et al[59,60]	2·17	2·00	(−0·92 to 4·92)
A to Z[36]	2·55	2·10	(0·11 to 4·09)
Bazzano et al[37]	2·52	3·50	(1·42 to 5·58)
Harvey–Berino[46]	1·55	4·00	(−0·57 to 8·57)
Pooled WMD (heterogeneity I^2=10·4%, p=0·33)		1·15	(0·52 to 1·79)



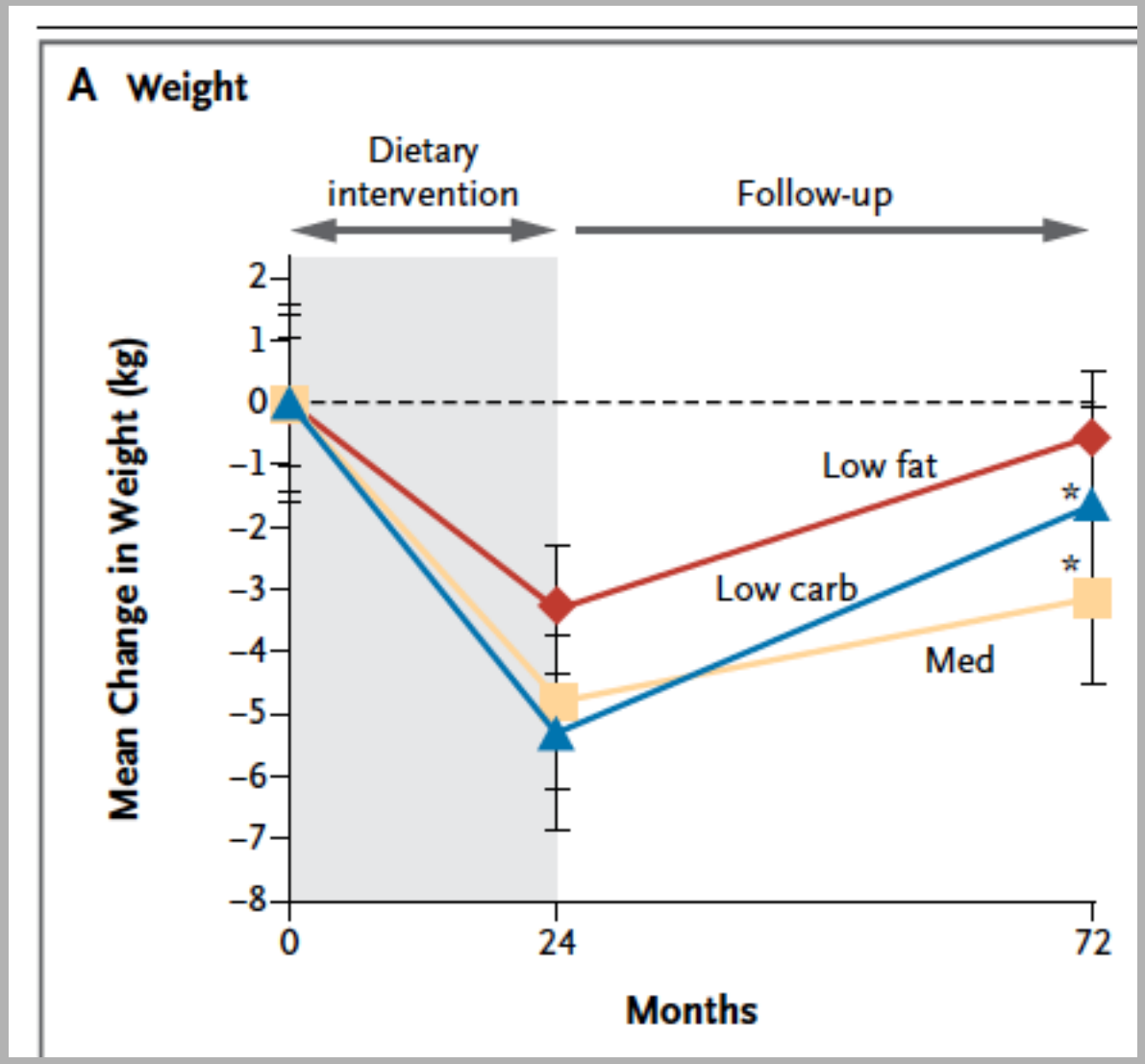
1.15 (0.52 to 1.79)

(Tobias DK et al. Lancet Diabetes-Endocrinology 2015)



Shai et al NEJM 2008

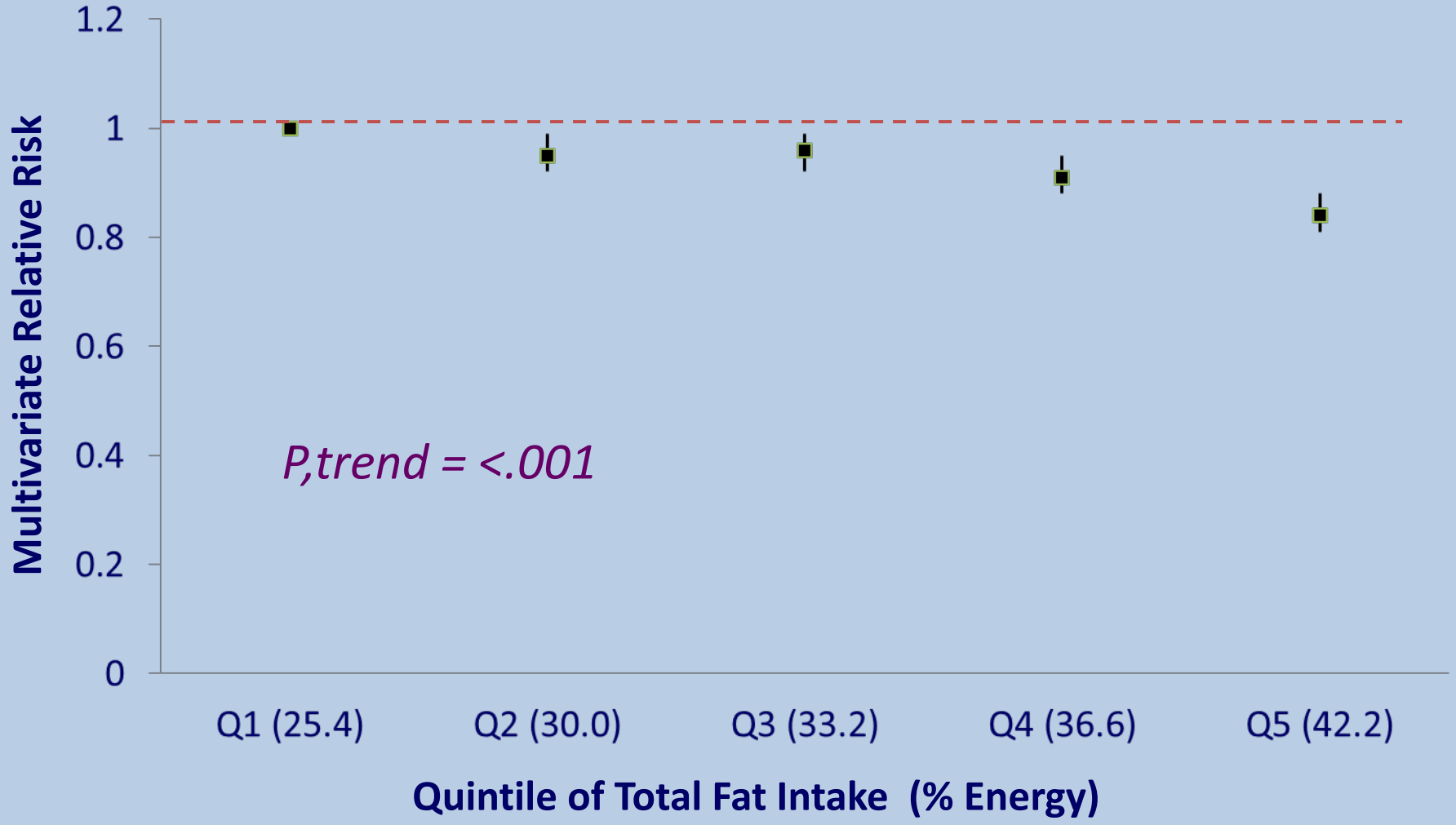
Superiority of Mediterranean and Low-Carb compared to Low-fat: A 6-Year Follow-up



(Schwarzfuchs et al. NEJM Oct 3, 2012)

Total Fat Intake (vs Carbohydrate) and Total Mortality in Men and Women

(n = 126,233; 33,304 deaths)

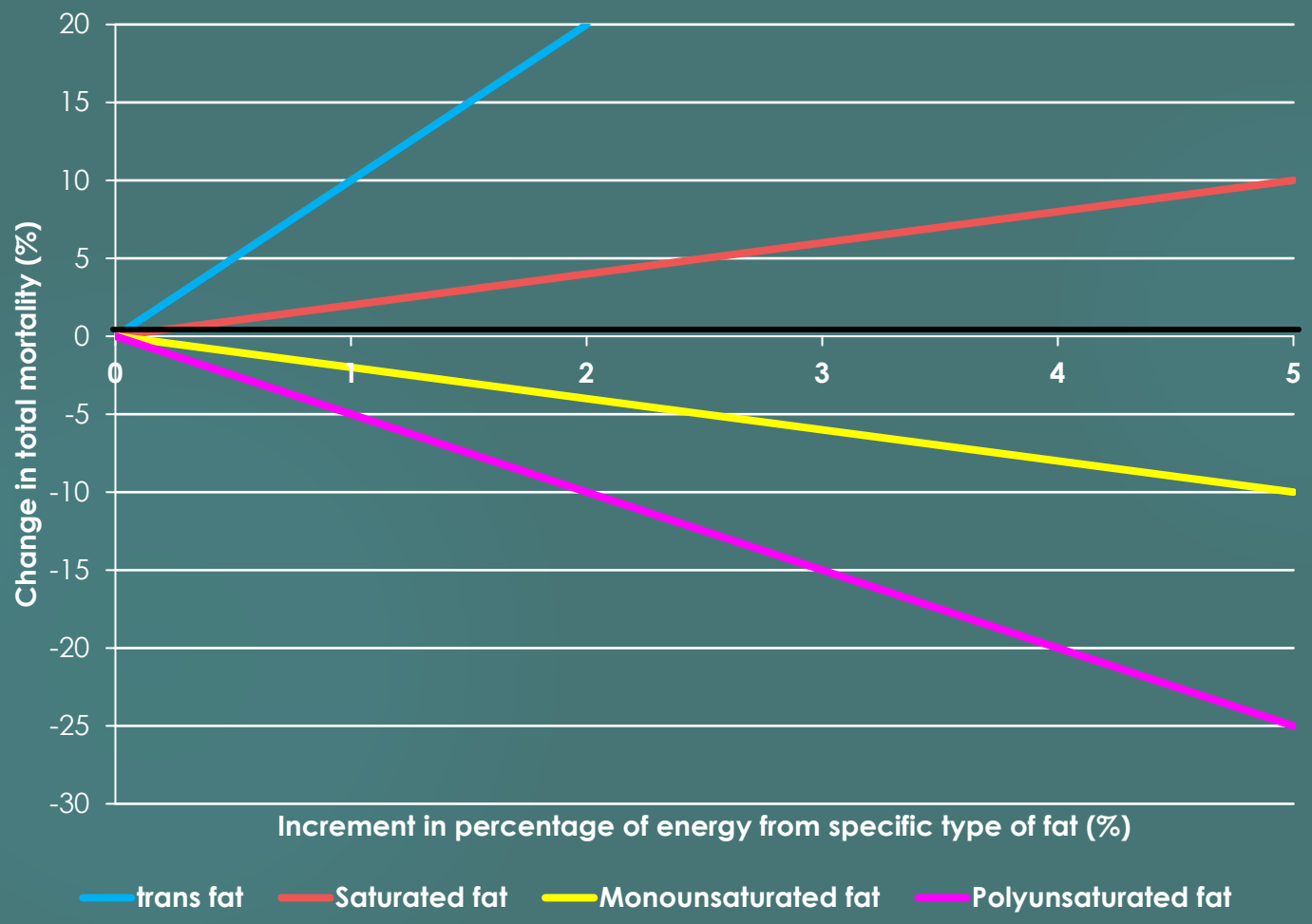


(Wang D et al. JAMA Intern Med, 2016)

29.641

Types of Fat and Total Mortality

- MV-adjusted results, isocaloric comparison is CHO



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

(Wang D et al. JAMA Intern Med 2016)

Conclusions: Total Fat and Health

- Dietary fat and health outcomes have been studied extensively over the last 40 yeas
- Higher Intake of dietary fat *per se* does not have adverse health effects
- The type of fat and also the form of carbohydrate are extremely important
- Replacing fat intake with carbohydrate can be harmful, especially if the carbohydrate is refined starch or sugar
- Recommendations to reduce or limit total fat intake are not supported by scientific evidence and can lead to greater morbidity and premature death

Major takeaways for 2015 DGAC report

- Focus on dietary patterns rather than individual nutrients – one size don't fit all
- **Remove restriction on total fat: types of fat are more important**
- Retain 10% upper limit on saturated fat
- Remove restriction on dietary cholesterol: eggs (moderate amount) are Okay
- Consider environment: reduce red meat for both health & planet
- Set a 10% calorie upper limit on added sugars
- Retain 2300 mg/day sodium limit, but not 1500 mg/day
- Coffee consumption as part of a healthy diet/lifestyle
- Farm-raised and wild-caught seafood are equally nutritious
- Promote "Culture of health": Accessible, affordable, and normative

National Disease Prevention and Health Promotion Initiative

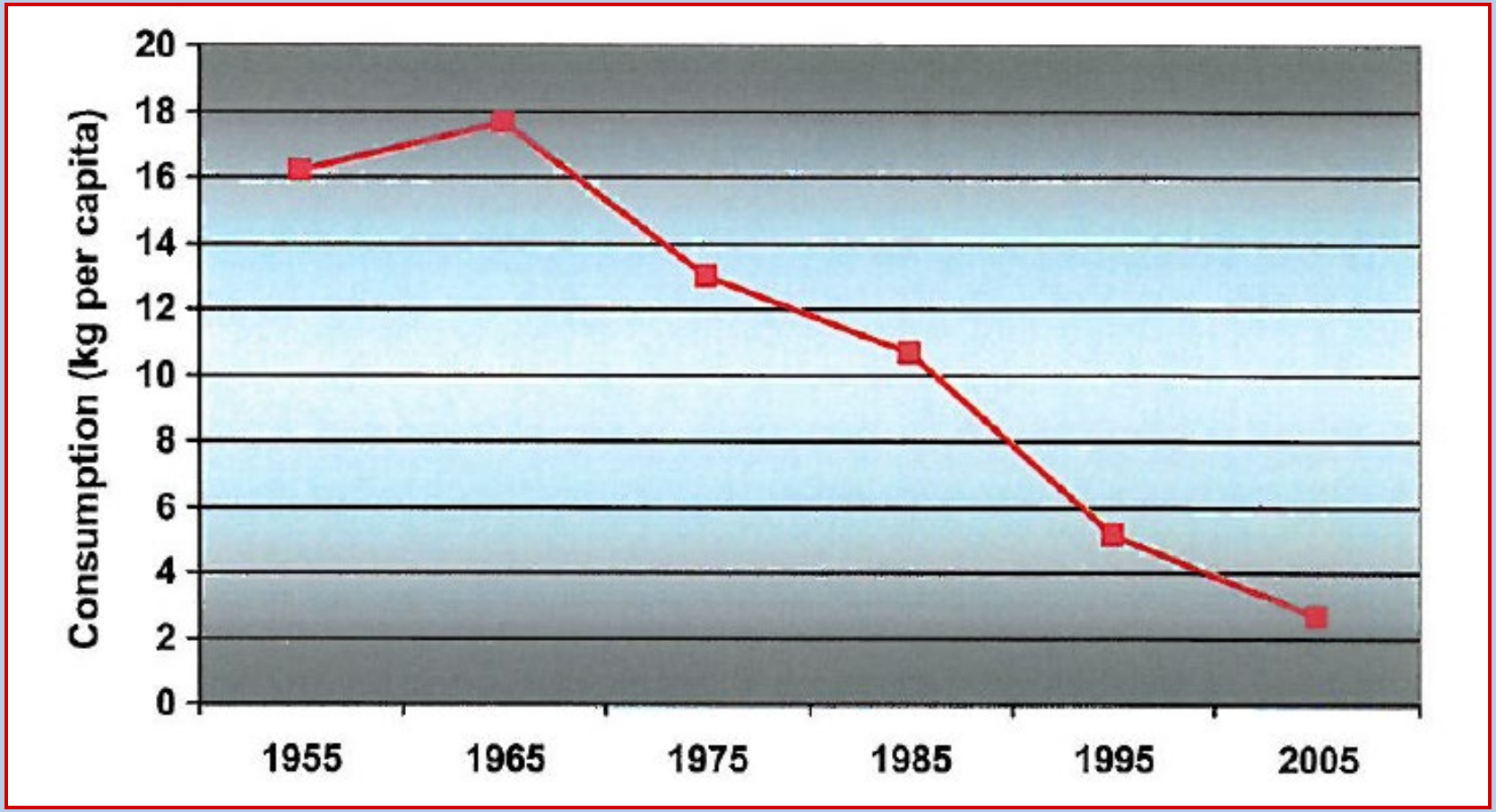
- Schools →
- Health Care Providers →
- Work Sites →
- Media →
- Physical Environment →
- Food Environment →
- Monitoring & Evaluation →
- Economic Analysis →

Vision: Healthy Choices Are Easy Choices for All

www.neconinfo.org

http://www.neconinfo.org/02-11-2003_Recommendations.pdf

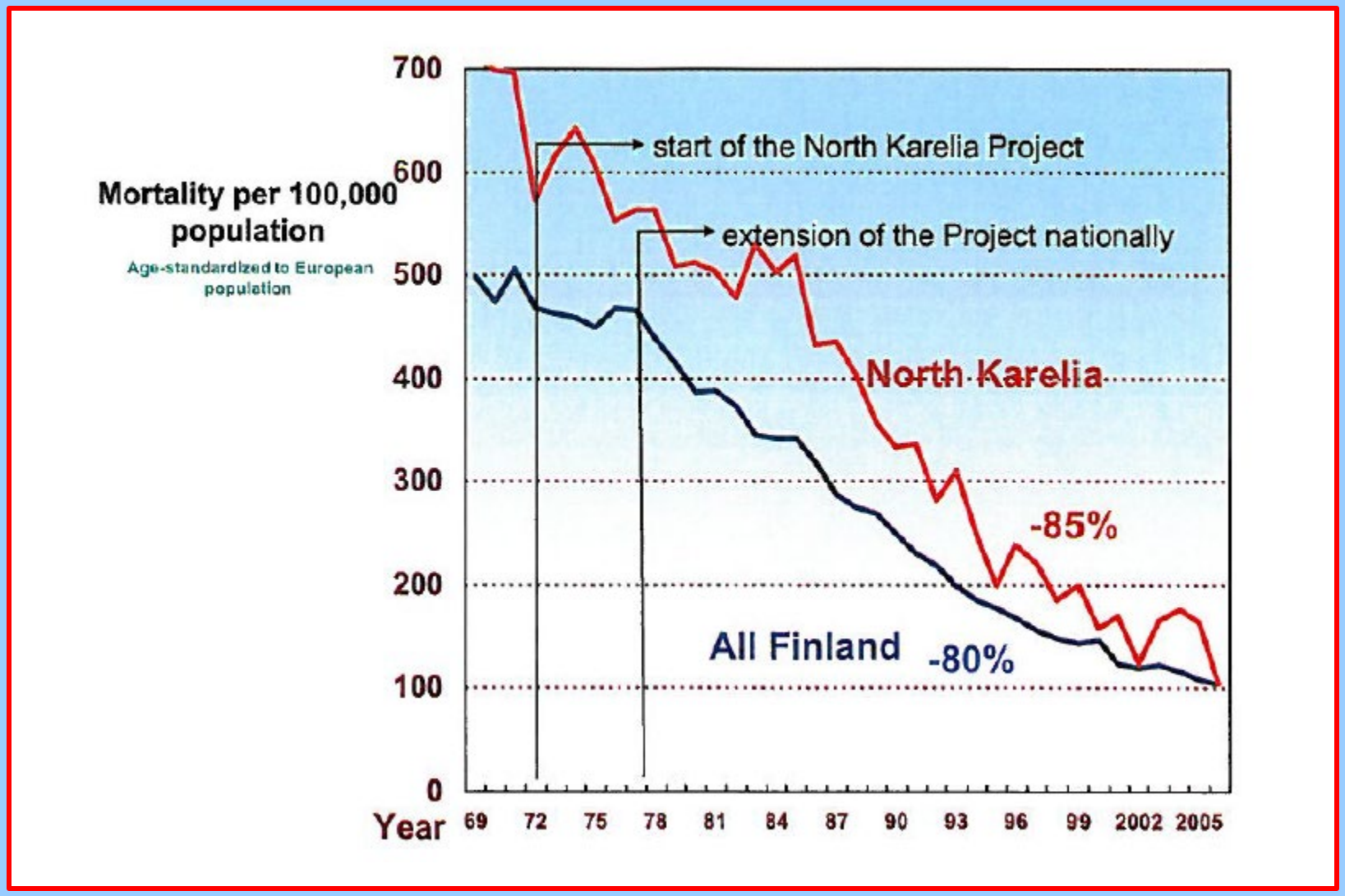
Butter consumption per capita in Finland, 1955-2005*



*NOTE: About 50% of the butter was replaced by rapeseed oil.

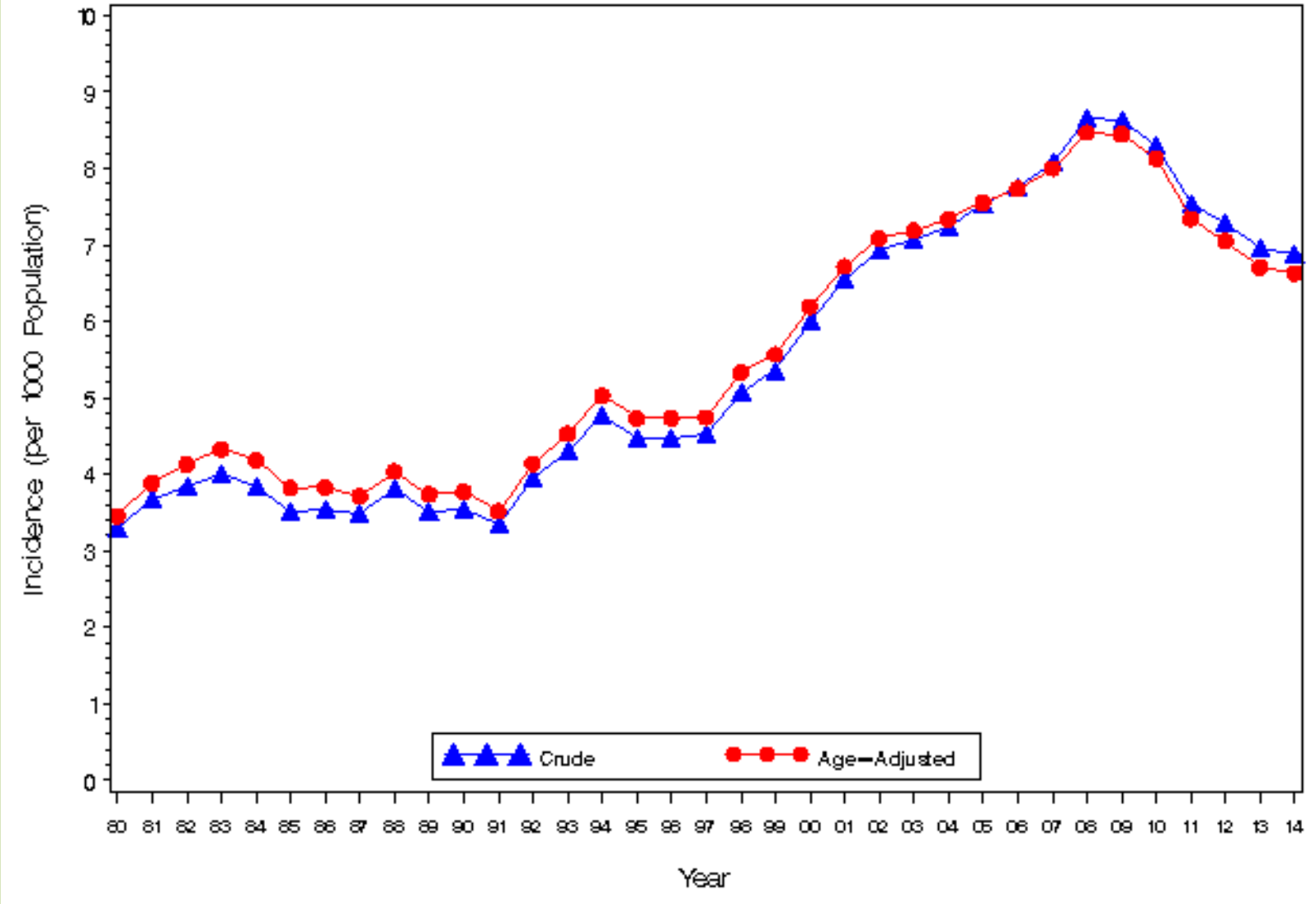
(Puska P et al., Ann Rev Public Health, 2010)

Age-adjusted mortality rates of coronary heart disease in North Karelia and in all of Finland among males ages 35-64 years, 1969-2006



(Puska P et al., Ann Rev Public Health, 2010)

Crude and Age-Adjusted Incidence of Diagnosed Diabetes per 1,000 Population Aged 18-79 Years, United States, 1980-2014



http://www.cdc.gov/diabetes/statistics/incidence/fig2.htm

21.081

21.082

Fast Food Menu in Athens

28.048

A healthy Mediterranean diet