Nutrition and heart disease: What's new in 2009

Two days in Cardiology, Chiangmai

5th December 2009

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การดูแลตัวเองด้านโภชนาการ เรื่อง ความดันโลหิตสูง โรคหัวใจและหลอดเลือด

11th September 2012

สมเกียรติ แสงวัฒนาโรจน์ พบ.

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Diets cause Coronary Heart Disease ?

Causal link diet & CHD: systematic review

Mente A. Arch Intern Med 2009;169:659-69

Table 1. Bradford Hill Criteria for Assessing Causation in Cohort Studies and Definitions Used in This Review

Criterion (No.)	Bradford Hill Criteria (1965)	Definition in This Review
Included in causation score		
Strength (1)	Most important factor; RR needed to define a strong association likely depends on phenomena being studied	Strong association for each dietary exposure was defined as summary RR of ≤0.83 or ≥1.20, statistically significant at $P<.05$, and in expected direction[a,b]
Consistency (2)	Finding of an association needs to be replicated in other studies	Consistency for each dietary exposure was defined as ≥67% of associations[c] showing strong[d] or modest[e] effect on primary outcomes in expected direction for dietary exposure in question[b]
Temporality (3)	Refers to temporal relationship of association between exposure and disease outcome; to infer causality, exposure must precede outcome	Measurement design of each observational study was temporally correct because analyses were restricted to prospective cohort studies, which ensured absence of outcomes at start of follow-up[f]
Coherence (4)	Cause-and-effect relationship should not conflict with known information on natural history and biology of disease (eg, consistent with sex differences, secular trends, geographic findings, histopathologic/laboratory studies, animal models)	Evidence needs to support an association of dietary exposure with surrogate risk factors for atherosclerosis or MI, or subclinical markers of atherosclerosis, or significant summary RR showing an association with primary outcomes in expected direction

Causal link diet & CHD: Cohorts

Mente A. Arch Intern Med 2009;169:659-69

Table 2. Agreement of Observed Data From Cohort Studies With Bradford Hill Criteria for Assessing a Potential Causal Relationship Between Selected Dietary Exposures and Coronary Heart Disease[a]

Dietary Exposure	Total No. of Patients	No. of Subcohorts	Strength, Summary RR (95% CI)[b]		Temporality[b]	Consistency in Coronary Outcomes, No. (%)[b]		Coherence[b]	No. of Criteria Met (of 4)
			Coronary Outcomes[c]	Coronary Outcomes and Secondary Events[c]		Coronary Risk or Mortality	Coronary Risk, Mortality, or MI		
"Mediterranean" diet[d]	66 337	4	0.63 (0.53-0.72)[e]	0.66 (0.57-0.75)[e]	Yes	4/4 (100)[e]	4/4 (100)[e]	Yes	4
High-quality diet	192 737	4	0.63 (0.45-0.81)[e]	0.63 (0.45-0.81)[e]	Yes	3/4 (75)[e]	3/4 (75)[e]	Yes	4
Vegetables	220 564	9	0.77 (0.68-0.87)[e]	0.77 (0.68-0.87)[e]	Yes	5/7 (71)[e]	6/11 (55)	Yes	4
Nuts	184 194	6	0.70 (0.57-0.82)[e]	0.67 (0.57-0.77)[e]	Yes	5/10 (50)	4/6 (67)[e]	Yes	4
Trans–fatty acids	145 132	4	1.32 (1.16-1.48)[e]	1.32 (1.16-1.48)[e]	Yes	3/4 (75)[e]	3/6 (50)	Yes	4
Glycemic index or load	338 410	8	1.32 (1.10-1.54)[e]	1.33 (1.13-1.52)[e]	Yes	4/6 (67)[e]	4/8 (50)	Yes	4
"Prudent" diet[f]	121 208	3	0.84 (0.61-1.07)	0.84 (0.61-1.07)	Yes	2/3 (67)[e]	2/3 (67)[e]	Yes	3[g]
"Western" diet[h]	121 208	3	1.33 (0.86-1.79)	1.33 (0.86-1.79)	Yes	2/3 (67)[e]	2/3 (67)[e]	Yes	3[g]
Monounsaturated fatty acids	101 521	4	0.80 (0.67-0.93)[e]	0.80 (0.67-0.93)[e]	Yes	2/4 (50)	3/5 (60)	Yes	3[g]

[g] Bradford Hill score is 4 when restricting analyses to cohort studies of high methodologic quality (low risk of bias).

Causal link diet & CHD: RCTs

Mente A. Arch Intern Med 2009;169:659-69

Table 4. Evidence From RCTs[a]

Dietary Exposure	Causation Score (of 4)	Total Trials: No. (%) of Tested Associations With Significant Effect[b]	Total Trials: Summary RR (95% CI)	Trials With Low Risk of Bias, High Methodologic Quality: No. (%) of Studies With Significant Effect	Trials With Low Risk of Bias, High Methodologic Quality: Summary RR (95% CI)	Consistent With Findings Using the Bradford Hill Criteria	Comments
"Mediterranean" diet[c]	4	2/2 (100)[d]	0.32 (0.15-0.48)[d]	. . .		Yes	Strong evidence of causation in cohort studies; strong effects in RCTs, albeit 1 study
Fish	3	0/3	1.12 (0.66-1.59)	. . .		No	Moderate evidence in cohort studies; no evidence of an effect in RCTs
Fruits and vegetables	3	0/2	1.01 (0.74-1.27)	. . .		Unknown	Unable to assess; only 1 RCT
Fiber	3	0/1	1.11 (0.96-1.29)	. . .		Unknown	Unable to assess; only 1 RCT
ω-3 Fatty acids							
Marine (excluding α-linolenic acid)	3	5/19 (26)	0.77 (0.62-0.91)[d]	1/9 (11)	0.57 (0.34-0.80)[d]	Yes	Moderate evidence in cohort studies; significant effect in RCTs
Marine and α-linolenic acid	2	5/20 (25)	0.80 (0.65-0.94)[d]	1/9 (11)	0.57 (0.34-0.80)[d]	No[e]	Weak evidence in cohort studies; significant effect in RCTs
Supplementary vitamin E	2	3/35 (9)	0.92 (0.84-1.01)	2/24 (8)	0.93 (0.82-1.03)	Yes	Weak evidence in cohort studies; nonsignificant effects in RCTs
Supplementary ascorbic acid	2	0/3	0.98 (0.70-1.25)	0/3	0.98 (0.70-1.25)	Yes	Weak evidence in cohort studies; nonsignificant

อาหารเมดิเตอเรเนียน

Mediterranean food

Mediterranean diet & mortality

Meta-analysis. Sofi F. BMJ 2008;337:a1344
doi:10.1136/bmj.a1344

- Studies analysed prospectively association between adherence to Mediterranean diet, mortality & incidence of diseases; 12 studies, with 1,574,299 subjects followed for 3-18 yrs
- 8 cohorts (514,816 subjects & 33,576 deaths): two point increase in the adherence score was significantly associated with a ***reduced risk of total mortality (9%),CV mortality (9%),cancer mortality(6%),Parkinson's/Alzheimer's dis(13%)***

Mediterranean diet & mortality

Meta-analysis. Sofi F. BMJ 2008;337:a1344
doi:10.1136/bmj.a1344

- Mediterranean diet score (n = 9)
  1. High ***Legumes***,
  2. High ***Wholegrain*** (cereal),
  3. High ***Fruits/nuts***,
  4. High ***Vegetables***,
  5. High ***Fish***,
  6. High ***MUFA:SFA*** ratio,
  7. Moderate ***Alcohol***,
  8. Low ***Red and processed meat*** (poultry),
  9. low ***Diary*** product

Mediterranean diet & mortality

Meta-analysis. Sofi F. BMJ 2008;337:a1344
doi:10.1136/bmj.a1344

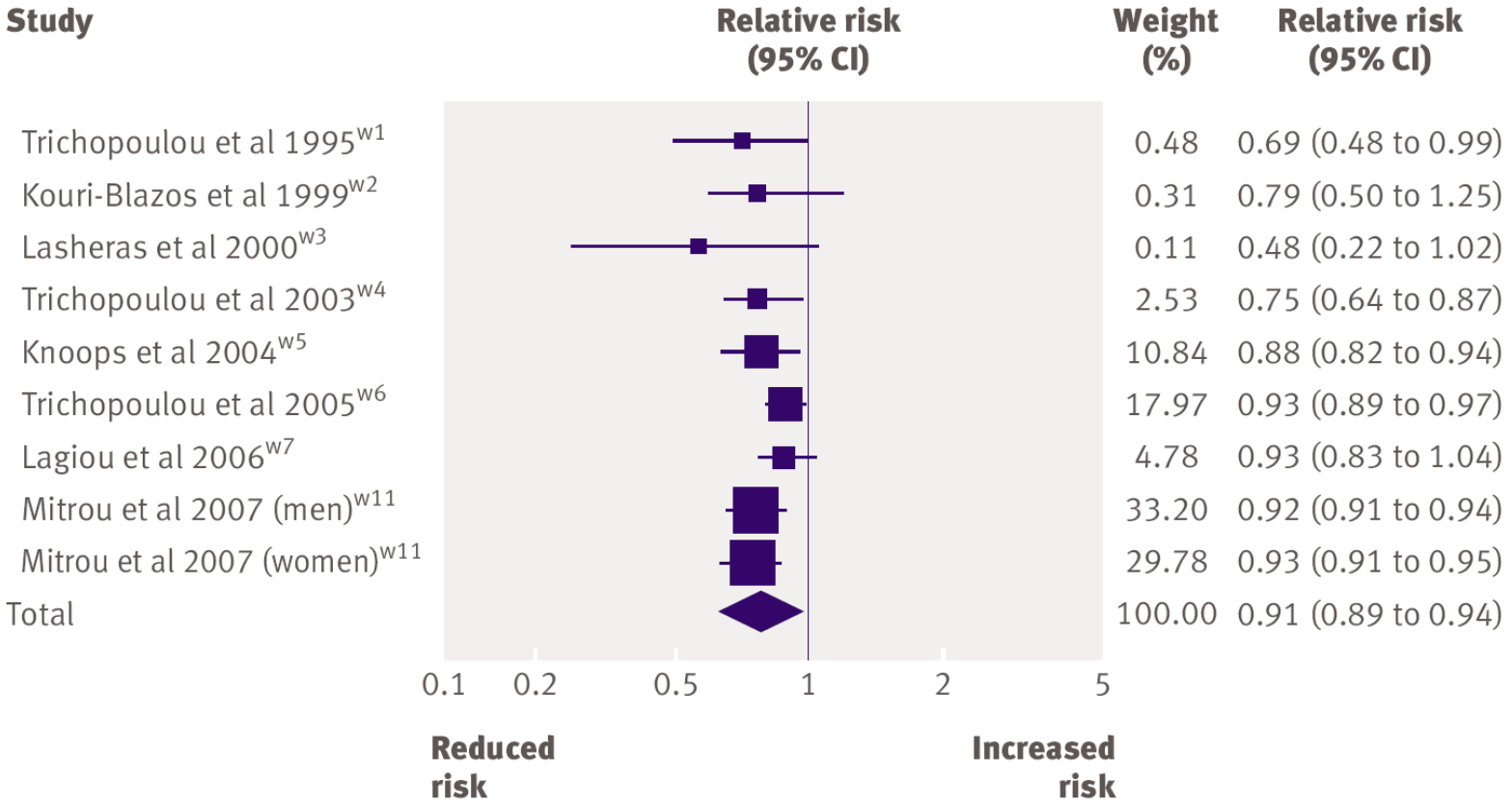


Fig 2 | Risk of all cause mortality associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size

Mediterranean diet & CV mortality

Meta-analysis.Sofi F. BMJ 2008;337:a1344
doi:10.1136/bmj.a1344

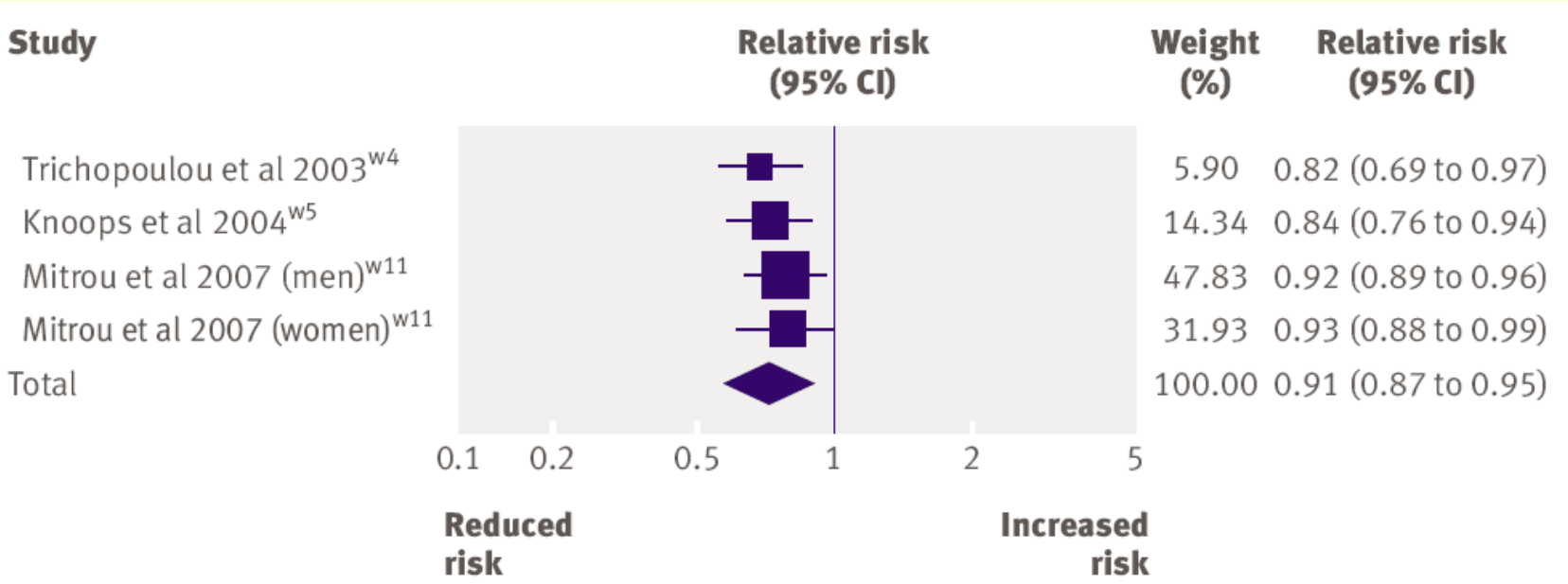


Fig 3 | Risk of mortality from cardiovascular diseases associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size

Mediterranean diet & CA mortality

Meta-analysis.Sofi F. BMJ 2008;337:a1344
doi:10.1136/bmj.a1344

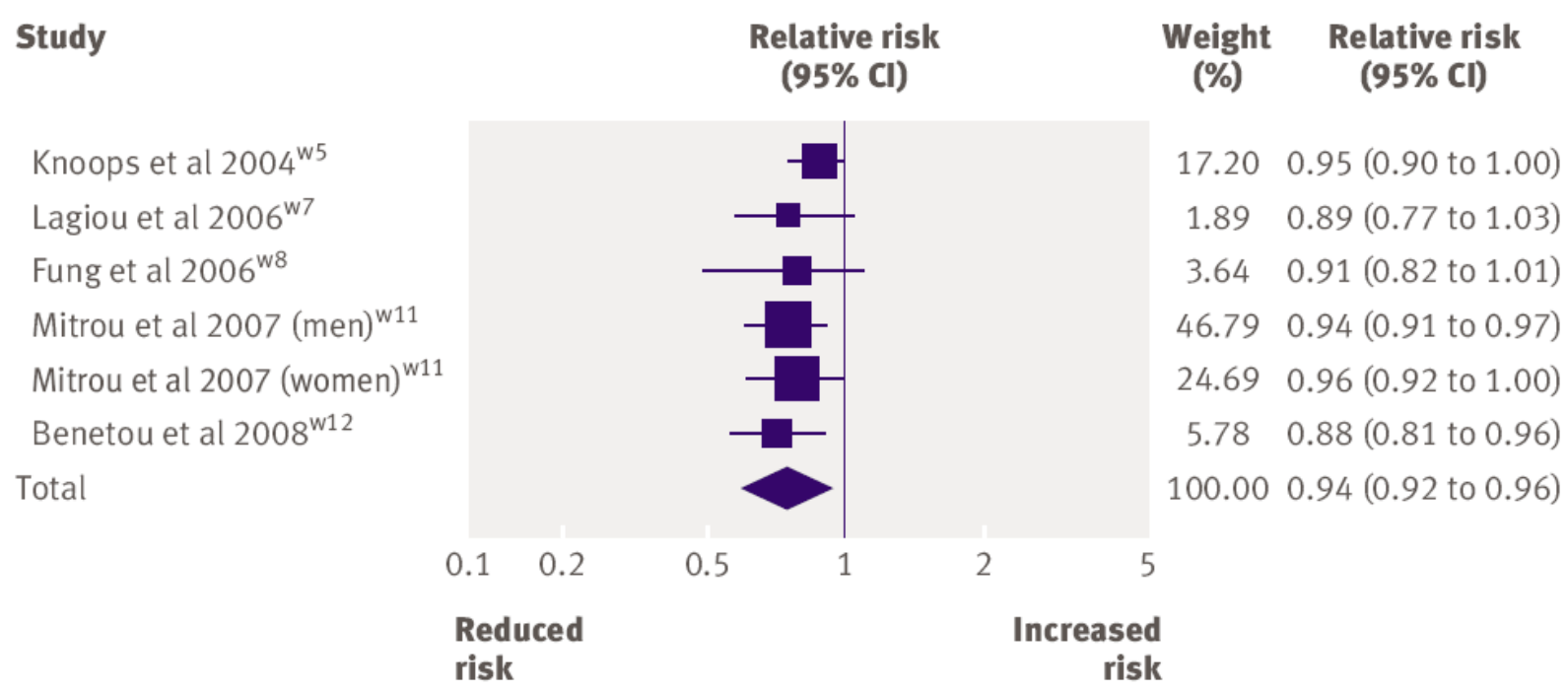


Fig 4 | Risk of occurrence of or mortality from cancer associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size

Mediterranean diet & Parkinson & Alzheimer's disease

Meta-analysis.Sofi F. BMJ 2008;337:a1344. doi:10.1136/bmj.a1344

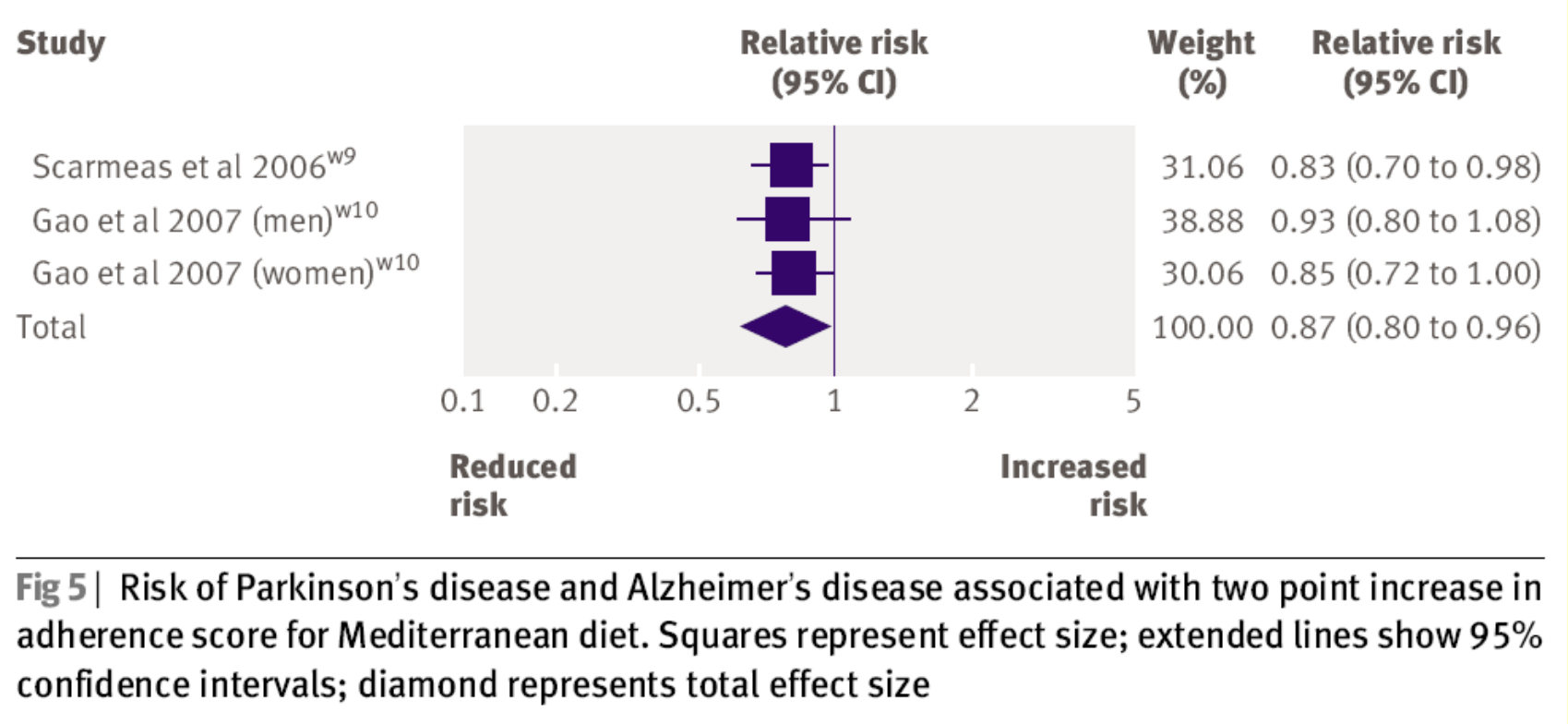


Fig 5 | Risk of Parkinson's disease and Alzheimer's disease associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size

aMediterranean diet Score & non-/fatal CVD

Fung TT.Circulation 2009;119:1093-100

- 74,886 ♀ 38-63 yrs, Nurses' Health (cohort) Study, ŝ CVD & DM, Followed Up 1984-2004.
- Alternate Mediterranean Diet Score from self-reported dietary data collected through validated food frequency questionnaires 6 times 1984 to 2002.
- 20 yrs FU, 2391 incident cases of CHD, 1763 stroke & 1077 CVD deaths

aMediterranean diet Score

Fung TT.Circulation 2009;119:1093-100

- Adapted Mediterranean diet scale(0-9): 9 dietary components
  - Presumed to be beneficial for health (0 or 1 if below or above median):
    1. Vegetables (excluding potatoes, French fries)
    2. Fruits
    3. Legumes
    4. Nuts
    5. Fish (and seafood)
    6. Whole grains (Cereals)
    7. Higher ratio of monounsaturates to saturates
  - Presumed not to be beneficial (0 or 1 if above or below median):
    8. Red, processed meat and meat products
  - 9. Ethanol (1: who consumed 5- 15 g/day or 0: otherwise)

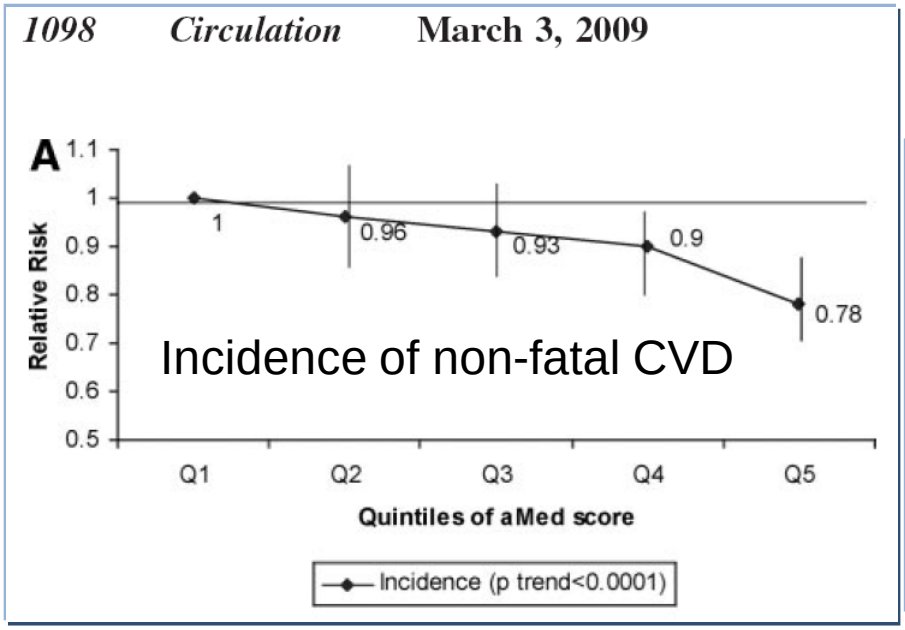
aMediterranean diet Score

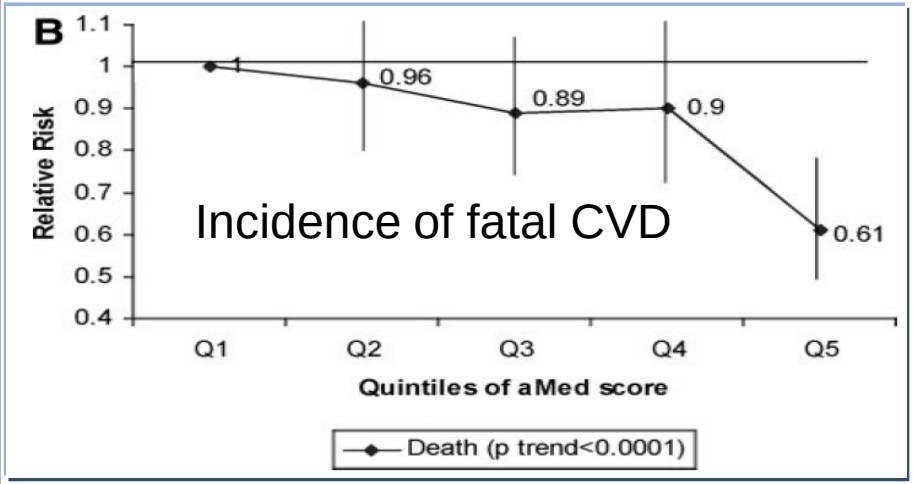
Fung TT.Circulation 2009;119:1093-100

† Servings per day unless otherwise stated.	aMed				
	Q1	Q2	Q3	Q4	Q5
Components of aMed score†	1.8 (0–2.5)	3.1 (2.5–3.4)	4.0 (3.5–4.4)	4.9 (4.5–5.4)	6.3 (5.5–9.0)
Alcohol, g	6.8	6.9	7.1	7.0	7.2
Monounsaturated to saturated fat ratio	0.97	1.02	1.03	1.04	1.08
Fish	0.2	0.2	0.3	0.4	0.5
Red/processed meat (30 gram/serving)	1.0	1.0	0.9	0.9	0.8
Whole grains	0.4	0.7	0.9	1.1	1.6
Legumes	0.2	0.3	0.4	0.5	0.6
Fruit	1.3	1.7	2.1	2.6	3.2
Vegetables (70 gram/serving)	1.8	2.4	3.0	3.6	4.4
Nuts	0.1	0.3	0.3	0.4	0.5

aMediterranean diet Score & non-/fatal CVD

Fung TT.Circulation 2009;119:1093-100





A, Multivariate (adjusted for age, BMI, smoking, physical activity, HT, Hypercholesterolemia, FHx CHD, Dietary intake & aMed scores) RR of CVD (combined CHD and stroke) by quintiles of aMed. incidence of CVD (*P for trend <0.0001).*

B, Multivariate (adjusted for the variables) RR of fatal CVD (combined CHD and stroke mortality) by quintiles of aMed. incidence of fatal CVD (*P for trend <0.0001).*

Mediterranean diet pyramid: a lifestyle for today
guidelines for adult population

อาหารกรีกแบบดั้งเดิม

Serving size based on frugality and local habits

Wine in moderation and respecting social beliefs

สัปดาห์ละ...

ทุกวัน

ทุกมื้อ

2010 edition

s = Serving

Fundación Dieta Mediterránea

ICAF International Commission on the Anthropology of Food and Nutrition

FORUM ON MEDITERRANEAN FOOD CULTURES

Predimed

Ciiscam

H.H.F. HELLENIC HEALTH FOUNDATION

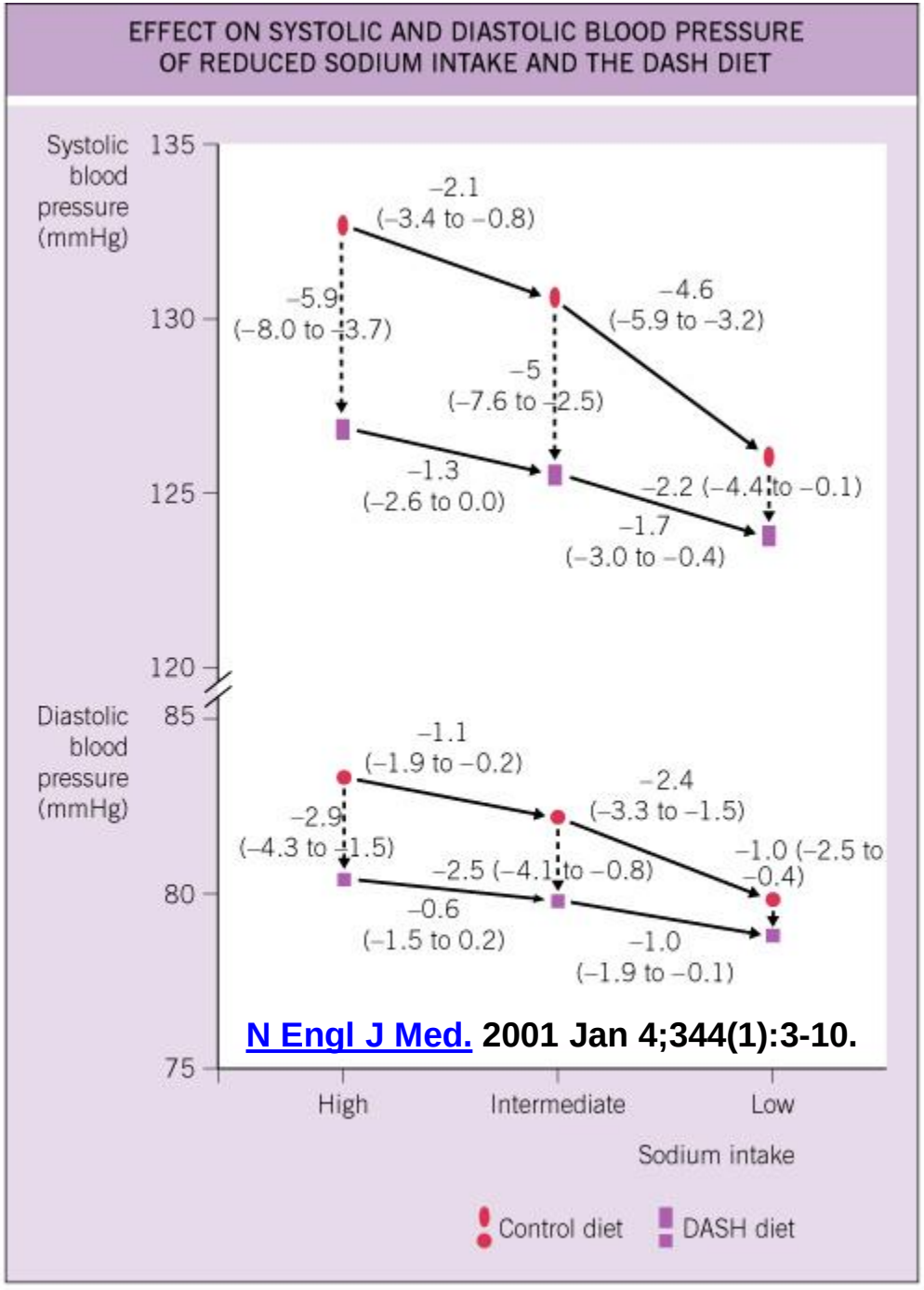
IUNS

CIHEAM

fens

Dietary Approaches to Stop Hypertension diet

N Engl J Med 1997;336:1117-24



N Engl J Med. 2001 Jan 4;344(1):3-10.

DASH diet lower Heart Failure rate

Levitan EB. Arch Intern Med 2009;169:851-7.

- Prospective observation in 36,019 women in Swedish Mammography Cohort, 48 - 83 yrs ŝ baseline HF, DM, or MI.
- Food-frequency questionnaires, A score ranking intake of DASH diet components & 3 additional scores based on food and nutrient guidelines.
- Cox proportional hazards models: rate ratios of HF-assoc hospitalization or death (Jan 1, 1998 to Dec 31, 2004)
- **During 7 yrs, 443 ♀ developed HF (28 HF deaths)**

DASH diet lower Heart Failure rate

Levitan EB. Arch Intern Med 2009;169:851-7.

- DASH diet component score: ranked on intake of
  - พืชสด
    - Fruits,
    - Vegetables,
    - Nuts and legumes,
    - Whole grains,
  - ด้อยมัน
    - Low-fat dairy products,

  } Highest = 5, lowest = 1

  - ลดเกลือ
    - Sodium,
  - น้ำตาลต่ำ
    - Sweetened beverages,
  - เนื้อน้อย
    - Red & processed meats.

  } Highest = 1, lowest = 5

- Scores were summed overall score. (Max. = 40)

DASH diet lower Heart Failure rate (37%)

Levitan EB. Arch Intern Med 2009;169:851-7.

Table 3. Association of DASH Scores With Incident Heart Failure

Variable	DASH Diet Score				*P* Value[a]
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
DASH diet component score					
Range	9-22	23-24	25-27	28-39	
No. of cases	162	87	105	89	
Person-years	68 296	44 213	66 395	66 231	
Model 1 RR (95% CI)[b]	1 [Reference]	0.81 (0.63-1.06)	0.67 (0.53-0.86)	0.59 (0.46-0.77)	<.001
Model 2 RR (95% CI)[c]	1 [Reference]	0.85 (0.66-1.11)	0.69 (0.54-0.88)	0.63 (0.48-0.81)	<.001

RR = rate ratio

[a] *P* for linear trend.
[b] Model 1: Cox proportional hazards models with baseline hazard allowed to vary by age.
[c] Model 2: Model 1 additionally adjusted for physical activity (linear), energy intake (linear), education status (<high school, high school, or university), family history of myocardial infarction at age younger than 60 years (yes or no), cigarette smoking (current, past, or never), living alone (yes or no), postmenopausal hormone use (yes or no), self-reported history of hypertension and high cholesterol concentration, body mass index (linear), and incident myocardial infarction (time varying: no myocardial infarction, myocardial infarction in the previous year, or myocardial infarction >1 year previously).

DASH diet lower Heart Failure rate

Levitan EB. Arch Intern Med 2009;169:851-7.

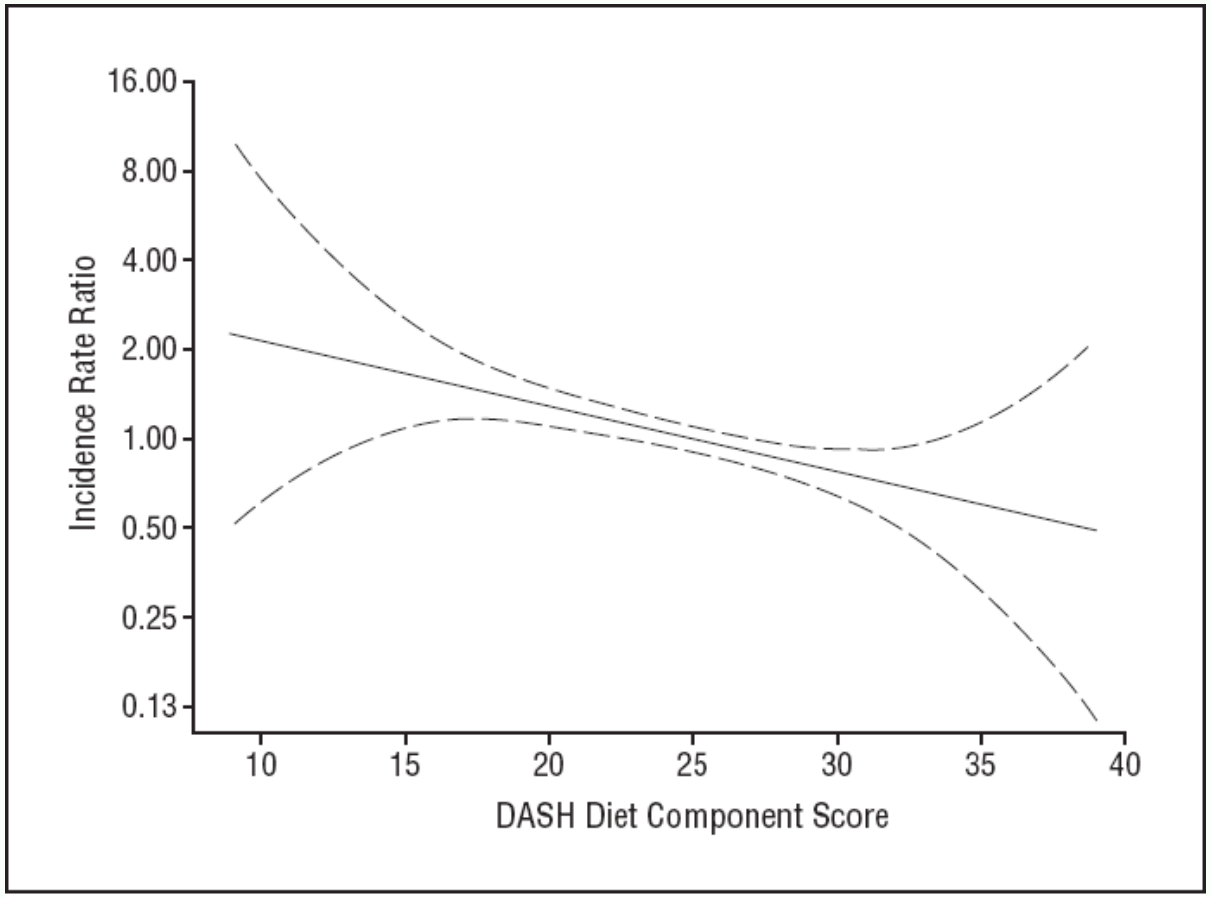


Figure 1. Rate of heart failure. The solid line represents the incidence rate ratio of heart failure, and dashed lines represent 95% confidence intervals. Penalized cubic splines with 3 *df* were used to flexibly model the shape of the association. Cox proportional hazards models that enable the baseline hazard to vary by age and adjusted for physical activity (linear), energy intake (linear),

DASH in HT lower total mortality

Parikh A.Am J Hypertens 2009;22:409-16.

- Prospective cohort study: association between diet & mortality in 5,532 HyperTensive adults in 3rd National Health and Nutrition Examination Survey. HT by self-report, medication use, or BP measured. 24-h dietary recall 9 nutrient targets.
- 1ry outcome was all-cause mortality.
- 391 (7.1%) DASH-like diet. Average 8.2 person-yrs FU, 1,537 all-cause deaths: 312 cancer deaths & 788 CV deaths (447 IHD & 142 stroke deaths)

DASH in HT lower total mortality

Parikh A.Am J Hypertens 2009;22:409-16.

- Adjusting for multiple confounders, utilizing survey weights, strata & clusters in Cox proportional hazards models, DASH-like diet associated with ↓
  - **All-cause deaths (HR 0.69, 95% CI 0.52–0.92)**
  - **Stroke deaths (HR 0.11, 95% CI 0.03–0.47).**
  - CVD deaths (HR 0.92, 95% CI 0.63–1.35),
  - IHD deaths (HR 0.77, 95% CI 0.47–1.24),
  - Cancer deaths (HR 0.51, 95% CI 0.23–1.10)

กินข้าวแป้งน้อย+โปรตีนมากเพิ่มโอกาสตาย 30%

Noto H. Systematic review. PLoS One 2013; 8(1): e55030. doi:10.1371/journal.pone.0055030

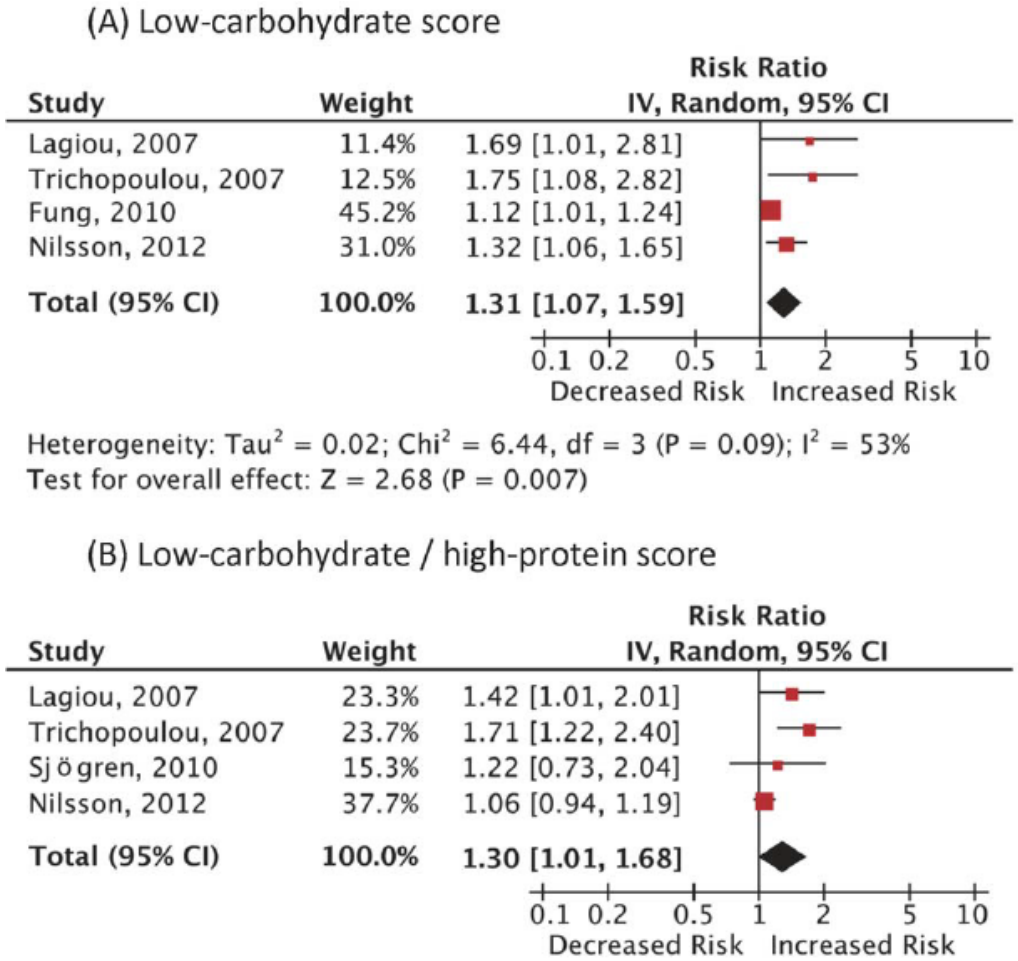


Figure 2. Adjusted risk ratios for all-cause mortality associated with low-carbohydrate diets.

Fruit, vegetable & heart disease

การกินผัก ผลไม้ กับ การเสียชีวิต

- ✓ 5 การศึกษา เปรียบเทียบ ผู้ที่กินมังสวิรัติ กับ กินเนื้อทุกมื้อ 43, 038 ฉนอเมริกัน และ ยุโรป 5.6-18.4 ปี
- ✓ กลุ่มมังสวิรัติ ลดการตายจากโรคหลอดเลือดหัวใจ

34 %

(95% CI 0.55 0.79)

Am J Clin Nutr 1999; 70(suppl): 516S - 24S

Mortality in Vegetarians & nonvegetarians

Key TJ. Public Health Nutr 1998; 1: 33-47

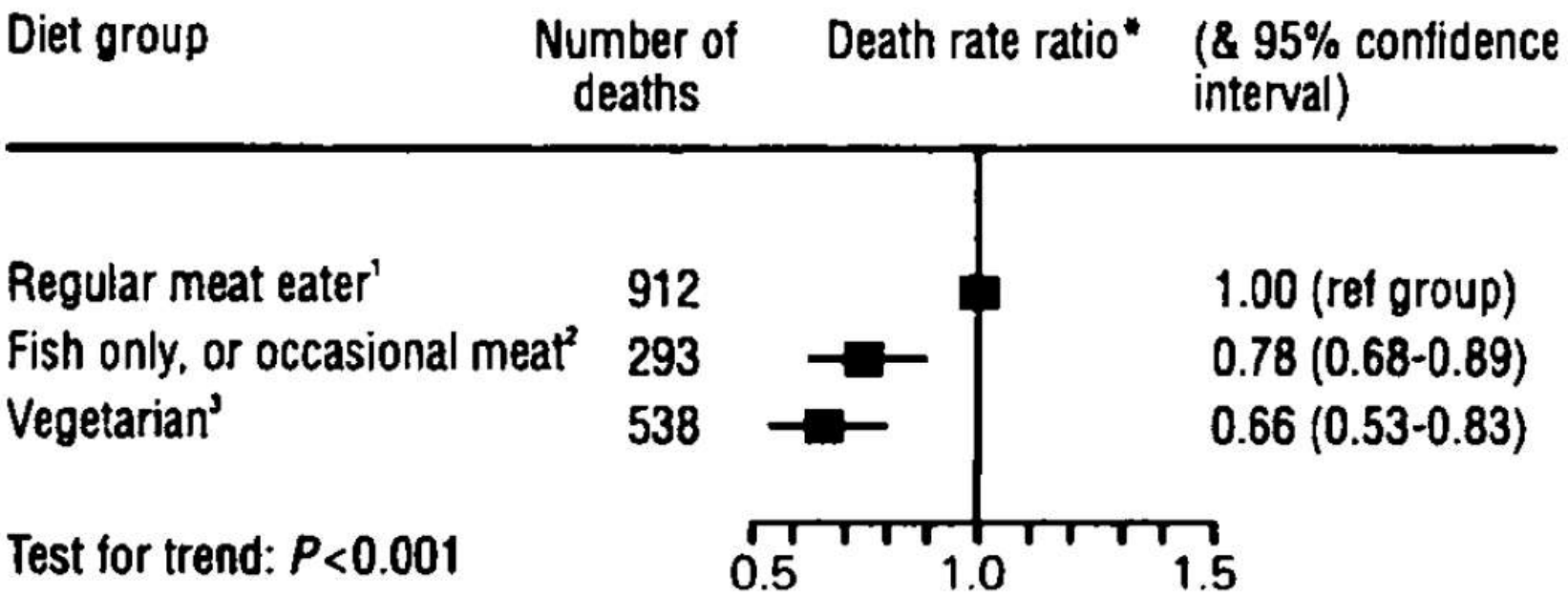


Fig. 1 Ischaemic heart disease death rate ratios by diet group. * Death rate ratios are adjusted for age, sex and smoking, and for study using a random effects model. [1] Meat eaten at least once per week. [2] Fish but not meat eaten, or meat eaten less than once per week. [3] No meat or fish eaten.

การกินผัก ผลไม้ กับ โอกาสเสี่ยงอัมพฤกษ์ อัมพาต

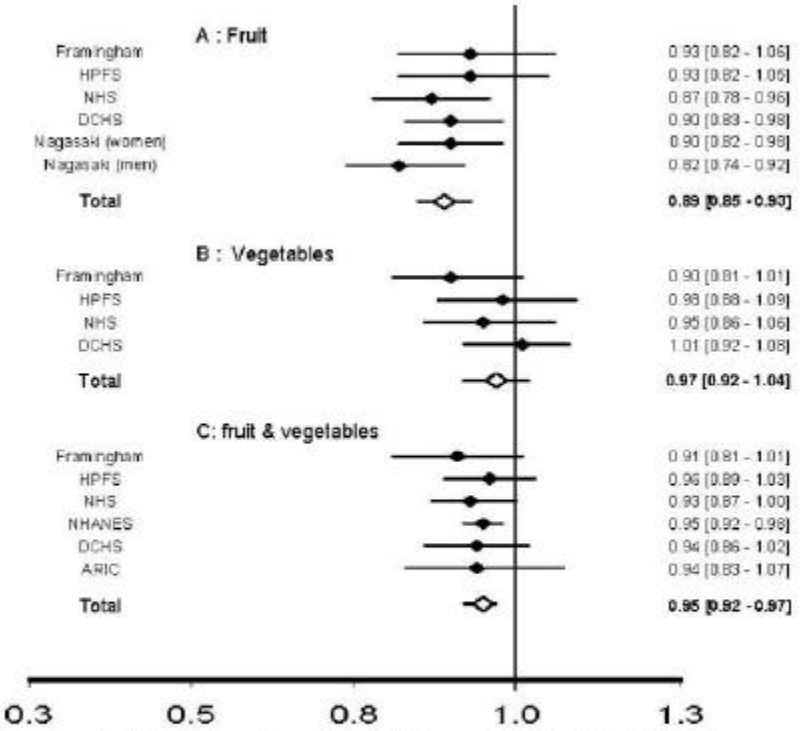


Figure 1. Pooled estimate of RR and 95% CI of stroke rates for one portion increment per day of fruit (A), vegetable (B), and fruit and vegetable (C). Dark diamonds indicate adjusted RR in each study. Open diamonds are pooled RR. Horizontal line represents 95% CI. Studies are ordered by year of publication.

โอกาสเกิดอัมพฤกษ์ อัมพาต ลดลง

- ๑๑ % ถ้ากินผลไม้เพิ่มขึ้นทุก ๆ ๑ ส่วนต่อวัน
- ๓ % ถ้ากินผัก เพิ่มขึ้นทุก ๆ ๑ ส่วนต่อวัน
- ๕ % ถ้ากินผักและผลไม้เพิ่มขึ้นทุก ๆ ๑ ส่วนต่อวัน

จาก ๗ การศึกษา ชาย ๙๐.๕๑๓ คน หญิง ๑๔๑.๕๓๖ คน และเกิดอัมพฤกษ์ อัมพาต ๒.๙๕๕ คน

Dauchet L. Neurology 2005;65:1193 - 97

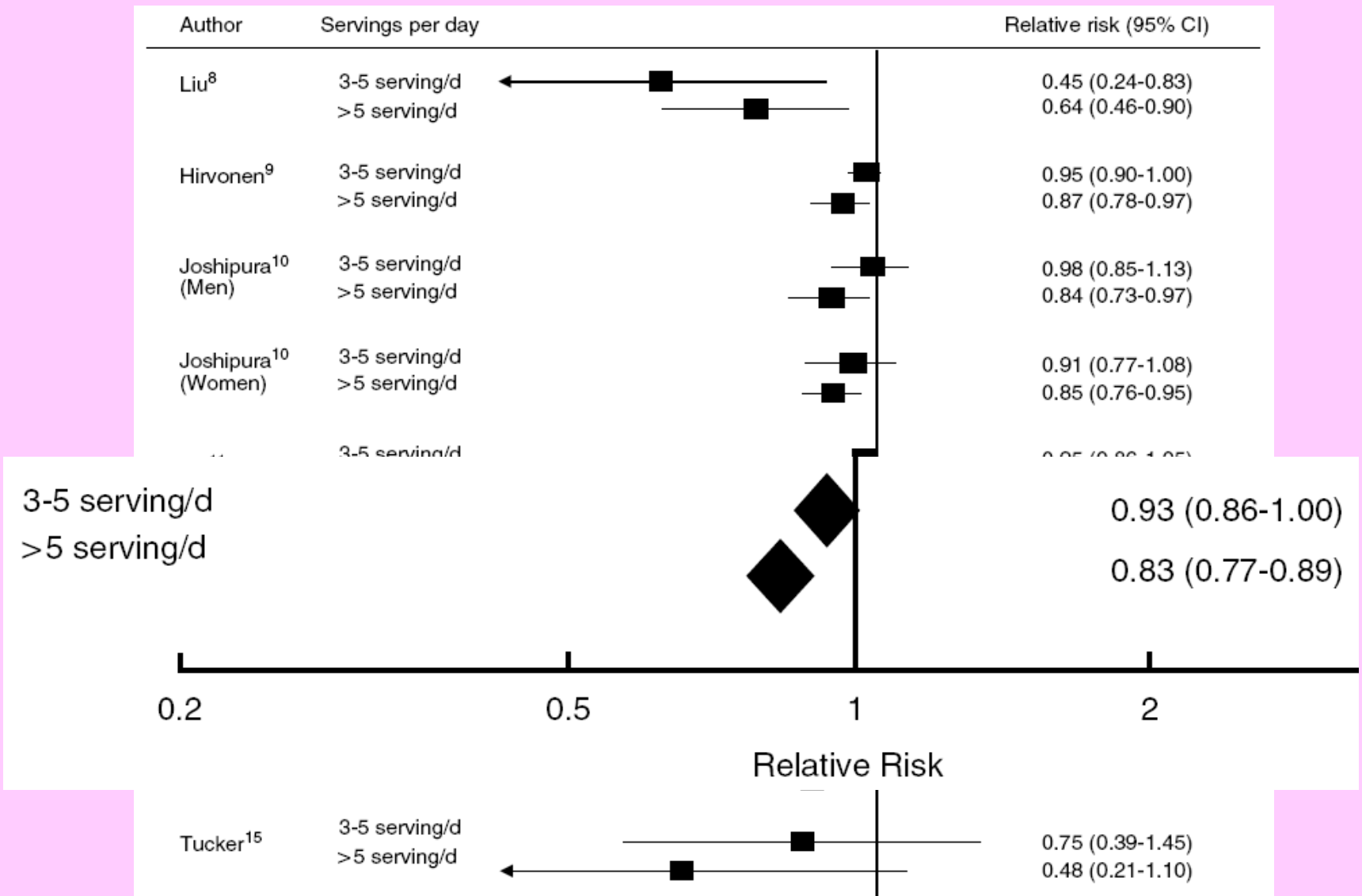
Fruit & vegetable reduce CHD risk

Meta-analysis. He FJ. J Human Hypertens 2007;21:717-28.

- Quantitatively assessed relation between fruit & vegetable intake & incidence of CHD by carrying out meta-analysis of cohort studies.
- Twelve studies, 13 independent cohorts, met inclusion criteria: 278,459 individuals (9,143 CHD events) with a median FU 11 yrs.

Fruit & vegetable 5 servings/d & CHD

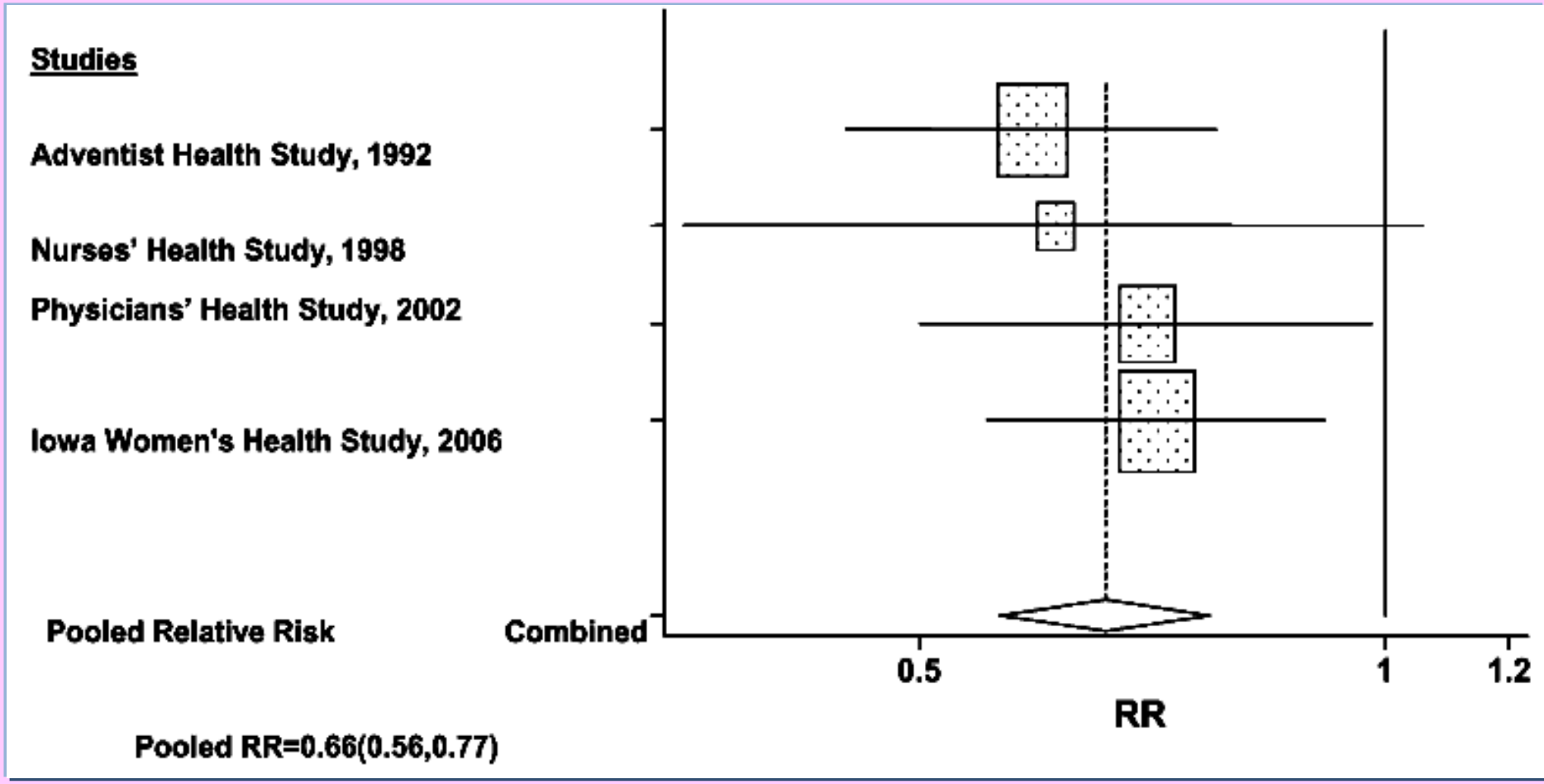
Meta-analysis. He FJ. J Human Hypertens 2007;21:717-28.



Nut, peanut & CHD

Nuts, Peanuts prevent CHD

Kris-Etherton PM. J Nutr 2008;138:1746S-51S.



Pooled analysis of epidemiologic studies on nut consumption and CHD risk.

Nut & peanut butter lower CVD in T2DM women

Nurse's Health Study. J Nutr 2009;139:1333-8

- Cohort of 6,309 T2DM women, ŝ CVD or cancer at baseline, Food Frequency Questionnaires q 2-4 yrs (1980-2002)
- Incident MI, revascularization & stroke
- 54,656 person-yr FU, 452 (MI & revascularization) & 182 stroke cases

Nut & peanut butter lower CVD in T2DM women

Nurse's Health Study. J Nutr 2009;139:1333-8

TABLE 2 The association of consumption of nuts and peanut butter with CVD/MI among 6309 women with type 2 diabetes in the NHS[1]

Nuts and peanut butter consumption	Almost never	1–3 servings/mo to 1 serving/wk	2–4 servings/wk	≥5 servings/wk	*P*-trend
CVD					
Person-years	3832	18529	25876	6419	
n	51	220	316	47	
Age-adjusted RR	1ref	0.67 (0.48, 0.94)	0.68 (0.48, 0.95)	0.43 (0.28, 0.67)	0.015
Multivariate RR[2]	1ref	0.72 (0.50, 1.02)	0.80 (0.56, 1.14)	0.56 (0.36, 0.89)	0.44
MI					
n	39	152	229	32	
Age-adjusted RR	1ref	0.60 (0.40, 0.91)	0.63 (0.43, 0.93)	0.40 (0.24, 0.67)	0.05
Multivariate RR[2]	1ref	0.63 (0.41, 0.96)	0.74 (0.49, 1.13)	0.56 (0.33, 0.97)	0.85

[1] One serving nuts = 16 g (1 tablespoon) and 1 serving peanut butter = 28 g (1 ounce).

[2] Multivariate model was adjusted for age, BMI, physical activity, alcohol consumption, family history of MI, hormone use and menopausal status, smoking, aspirin intake, duration of diabetes years, hypertension, hypercholesterolemia, total energy intake, cereal fiber, glycemic load, saturated fat, and trans fat.

Salt, sodium & cardiovascular disease

Salt intake increase stroke & CVD risk

Systematic review/meta-a. Strazzullo P. BMJ 2009;339:b4567 doi:10.1136/bmj.b4567

- Medline (1966-2008),Embase (1988-),AMED (1985-), CINAHL (1982-), Psychinfo (1985-) & Cochrane Library.
- Relative risks & 95% CI and random effect model, weighting for inverse of variance. Heterogeneity, publication bias, subgroup, & meta-regression analyses.
- 19 independent cohort samples from 13 studies, with 177,025 participants (follow-up 3.5-19 yrs) & > 11,000 vascular events

Higher salt intake increase stroke risk (23%)

Systematic review/meta-a. Strazzullo P. BMJ 2009;339:b4567 doi:10.1136/bmj.b4567

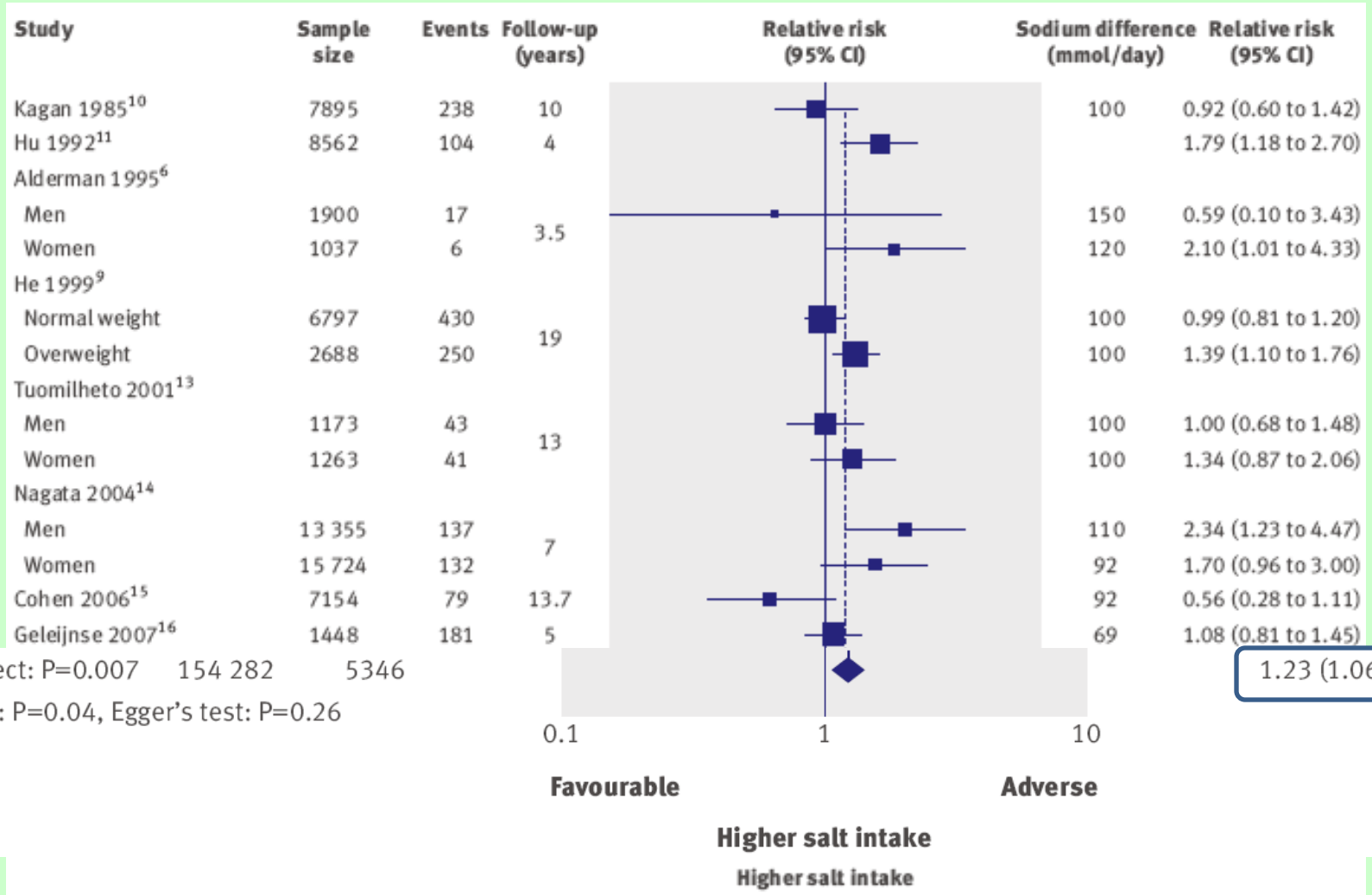


Fig 1 | Risk of incident stroke associated with higher compared with lower salt intake in 14 population cohorts from 10 published prospective studies including 154282 participants and 5346 events

Higher salt intake increase CVD risk (17%)

Systematic review/meta-a. Strazzullo P. BMJ 2009;339:b4567 doi:10.1136/bmj.b4567

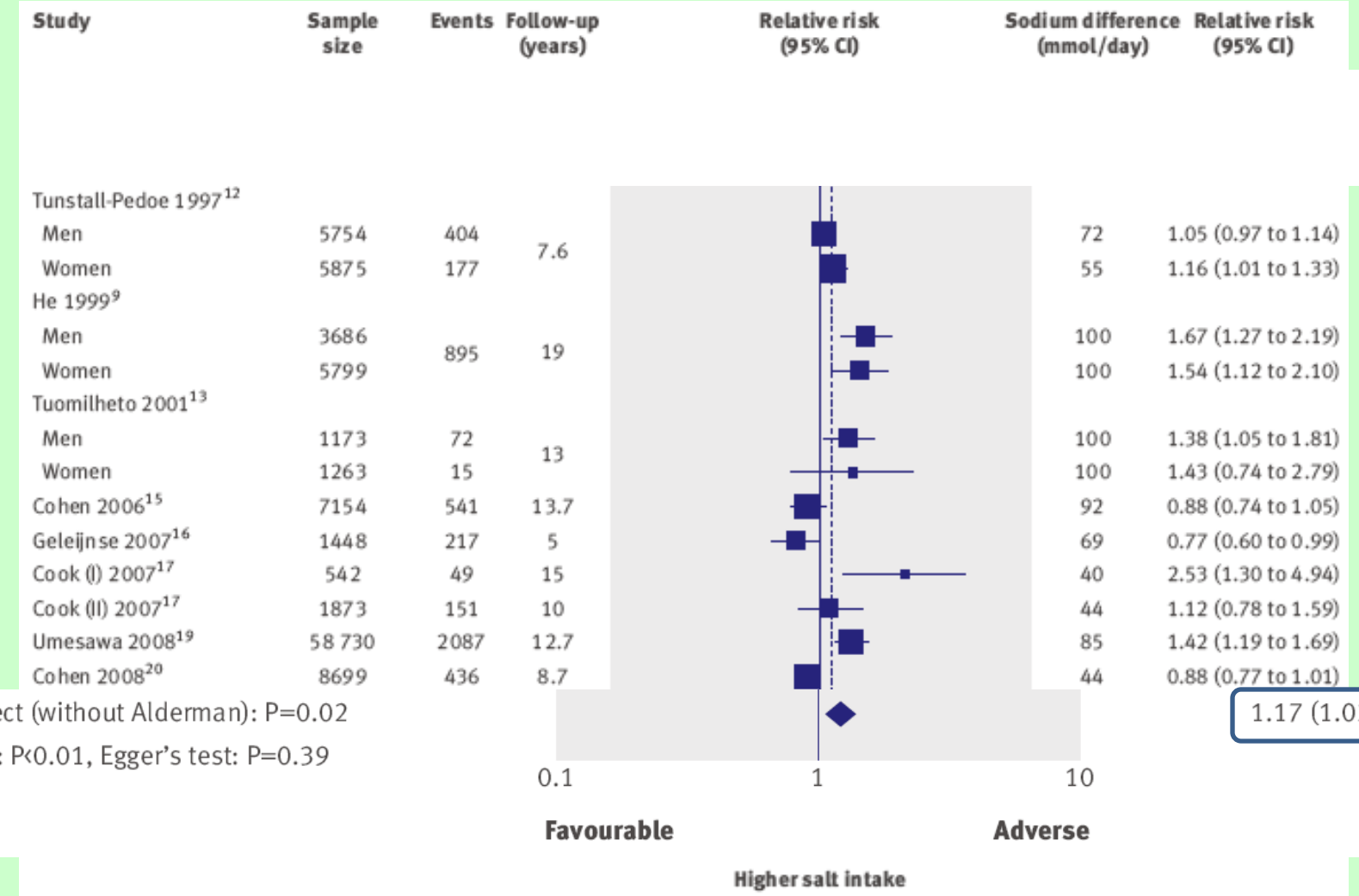
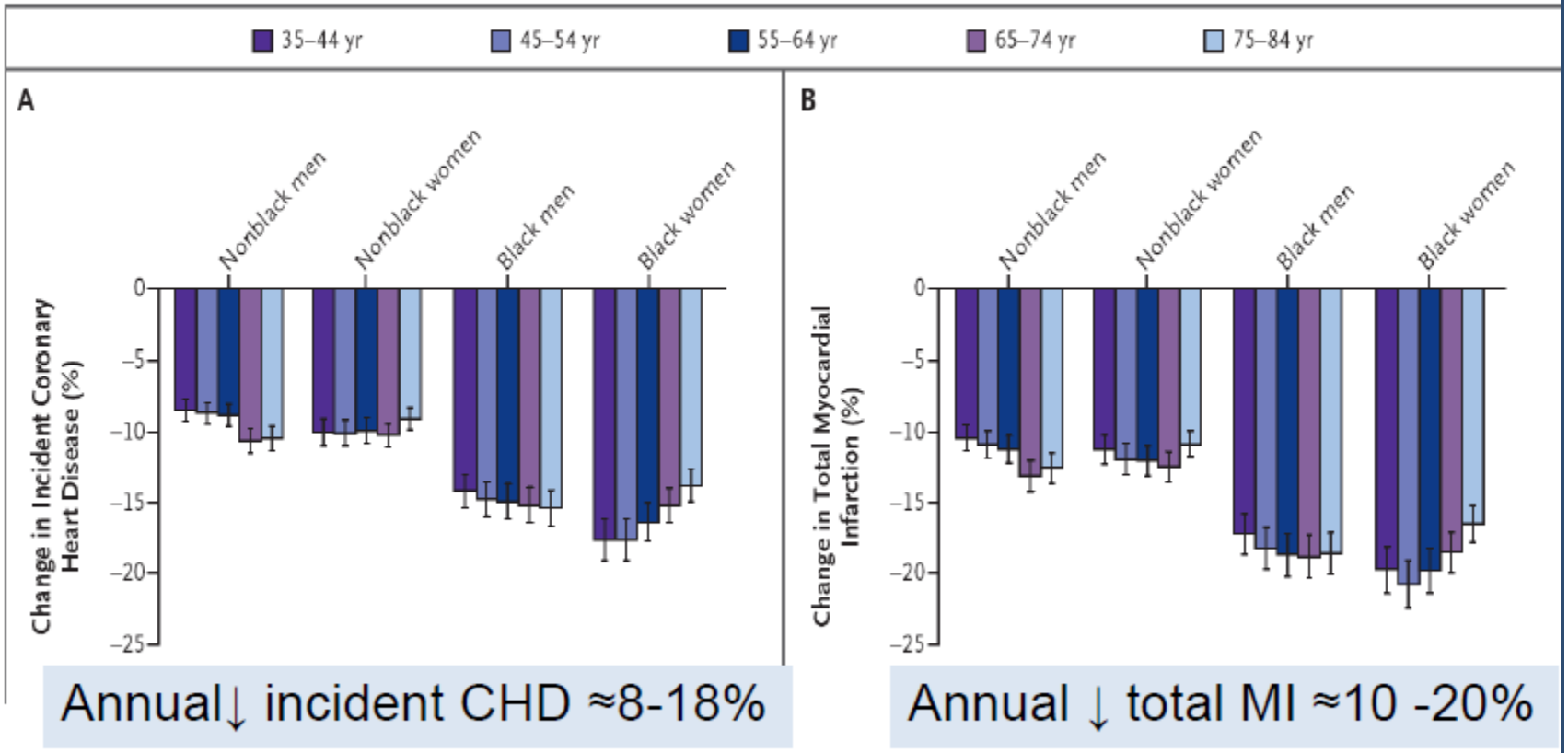


Fig 2 | Risk of incident cardiovascular disease associated with higher compared with lower salt intake in 14 population cohorts from nine published prospective studies including 104 132 participants and 5161 events. Pooled analysis after the exclusion of the study by Alderman et al[6] (men and women), including 102 086 participants and 5044 events

↓Dietary salt 3 g/d (Na 1.2g/d)

Bibbins-Domingo K. N Engl J Med 2010;362:590-9



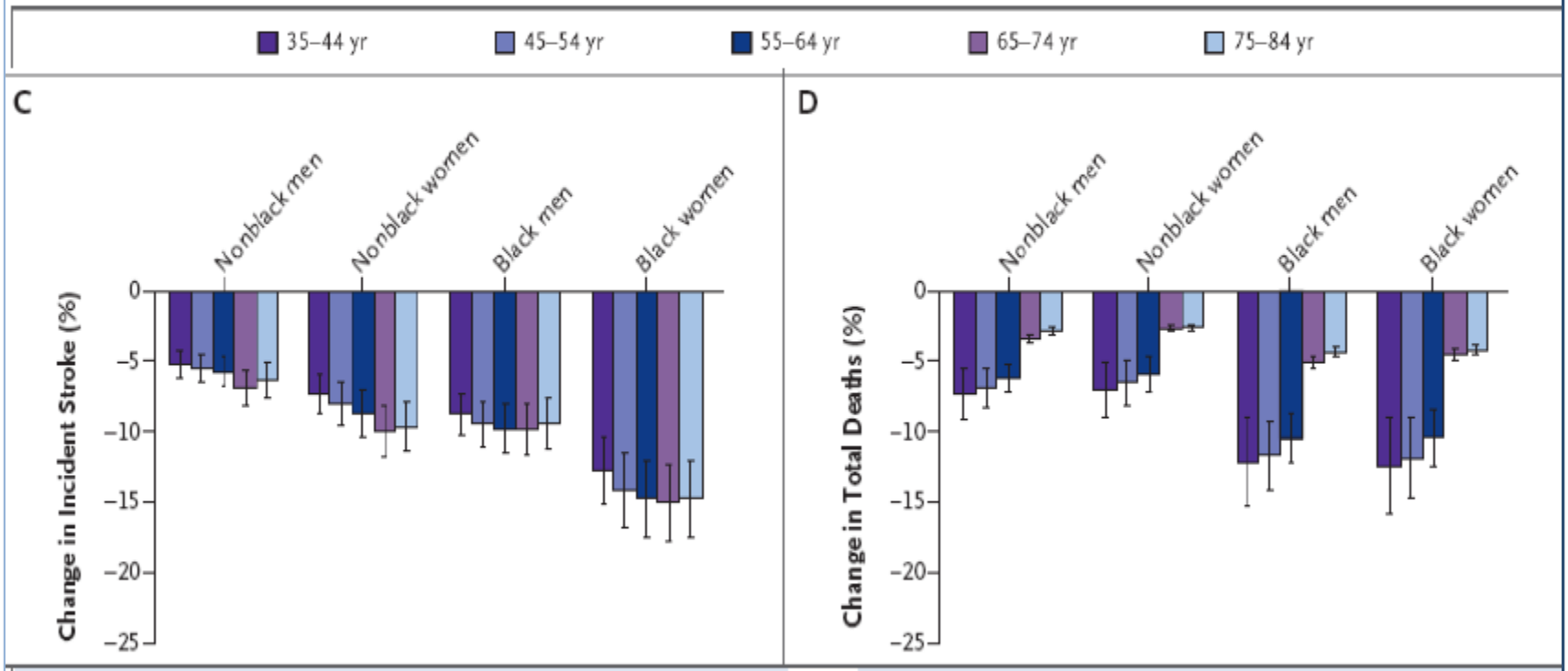
Annual↓ incident CHD ≈8-18%

Annual ↓ total MI ≈10 -20%

Highest estimate for effect of salt reduction on systolic BP

↓Dietary salt 3 g/d (Na 1.2g/d)

Bibbins-Domingo K. N Engl J Med 2010;362:590-9



Annual↓ incident stroke ≈5-15%

Annual ↓ total death ≈2 -12%

Highest estimate for effect of salt reduction on systolic BP

Dietary salt reduction vs. interventions

Bibbins-Domingo K. N Engl J Med 2010;362:590-9

Interventions	CHD incidence	Total death
Salt reduction **1 g/d** **3 g/d**	 **2.0 – 3.3 %** **5.9 – 9.6 %**	 **0.9 – 1.4 %** **2.6 – 4.1 %**
Smoking cessat^{n}	**3.7 %**	**4.3 %**
Weight loss	**5.3 %**	**2.0 %**
Statin Rx 1^{ry} Px	**5.3 %**	**0.3 %**
HT Med Rx	**9.3 %**	**4.1 %**

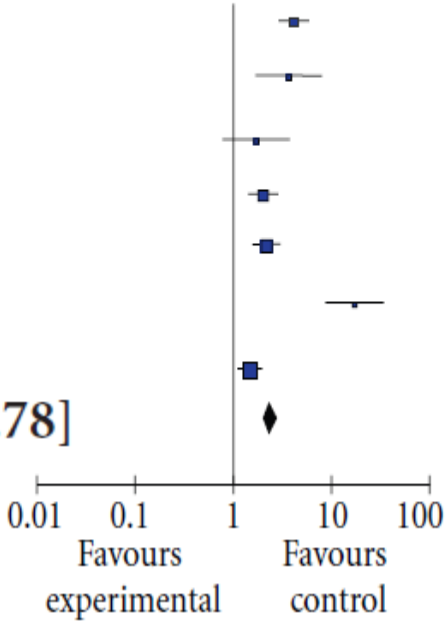
Projected estimated of population intervention on Annual Reduction in CV events (% change from expected)

อาหารเค็ม เพิ่มโอกาสมะเร็งกระเพาะอาหาร **2.4** เท่า

Systematic review. Ge S. Gastroenterol Res Practice 2012;ID 808120

Table 8: High versus low categories of salt and gastric cancer through salty food.

Study or subgroup	High salt		Low salt			Odds ratio	Odds ratio
	Events	Total	Events	Total	Weight	M-H, fixed, 95% CI	M-H, fixed, 95% CI
Pourfarzi et al. 2009 [13]	121	213	95	394	12.3%	4.14 [2.90, 5.91]	
Campos et al. 2006 [12]	19	30	197	617	2.9%	3.68 [1.72, 7.89]	
Ngoan et al. (men) 2002 [20]	8	657	35	4915	3.5%	1.72 [0.79, 3.72]	
Mary H. Ward 1999	105	355	75	435	20.3%	2.02 [1.44, 2.83]	
Tsugane et al. 2004 [21]	130	89048	58	86483	25.1%	2.18 [1.60, 2.97]	
Lee et al. 2003 [16]	47	69	22	199	1.5%	17.19 [8.77, 33.68]	
Yang et al. 2011 [17]	180	482	120	418	34.4%	1.48 [1.12, 1.96]	
Total (95% CI)		90854		93461	100.0%	**2.41 [2.08, 2.78]**	
Total events	610		602				
Heterogeneity: $Chi^2 = 56.59$, $df = 6$ ($P < 0.00001$); $I^2 = 89\%$							
Test for overall effect: $Z = 11.75$; ($P < 0.00001$)							



Meat intake & CV risk

Red (processed) meat ↑ mortality

Cohort of ½ million Americans.Sinha R. Arch Intern Med 2009;169:562-71

Total and cause-specific mortality in relation to red (or processed) meat intake: NIH Diet and Health Study

เพศ	ตายทุกสาเหตุ	ตายจากมะเร็ง	ตายจากโรคหัวใจและหลอดเลือด
ชาย	1.31(1.16) เท่า	1.22(1.12) เท่า	1.27(1.09) เท่า
หญิง	1.36(1.25) เท่า	1.20(1.11) เท่า	1.50(1.38) เท่า

Hazard ratios (HR) were adjusted for confounding factors and are for comparison between the highest and lowest quintiles of red or processed meat intake.
$p < 0.0001$ for all HR comparisons.

47 976 male deaths and 23 276 female deaths during 10 years of follow-up

Meat intake & CHD, DM risks

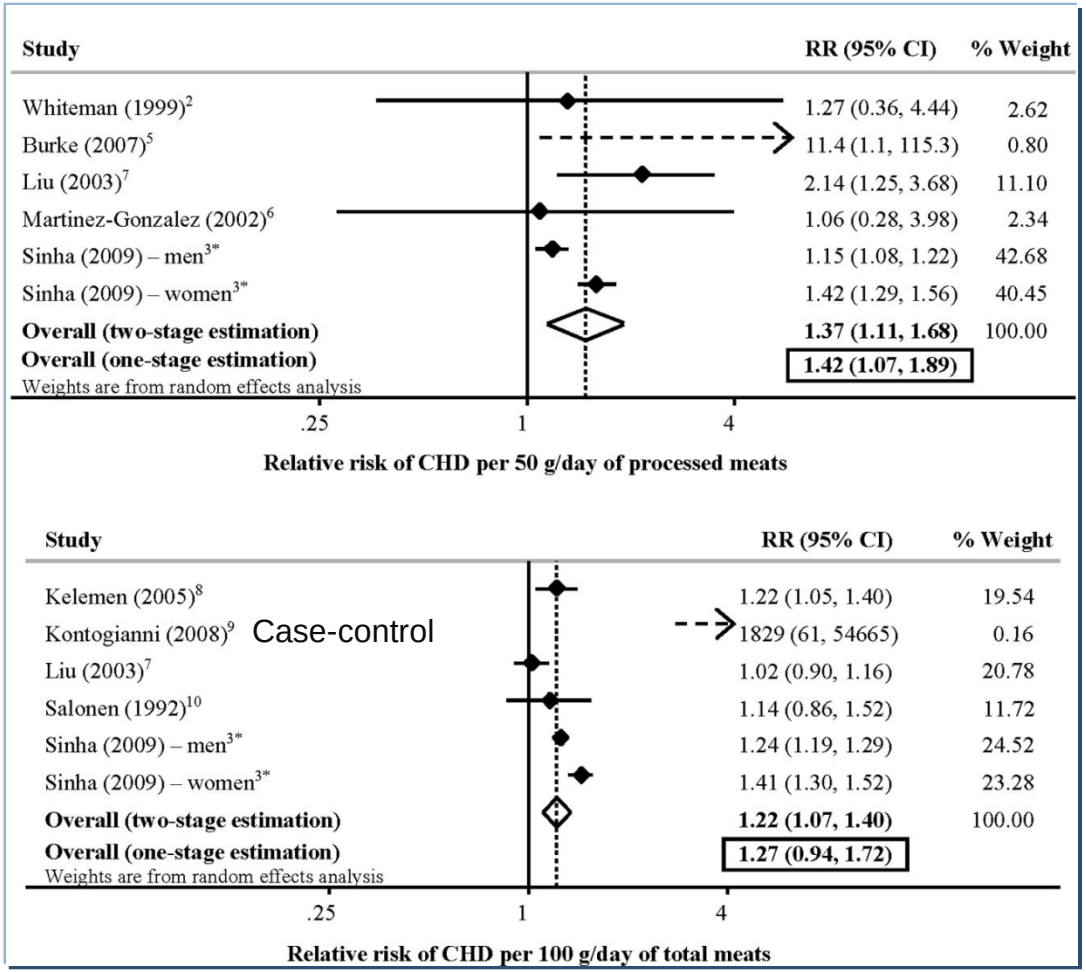
Systematic review. Circulation 2010;121:2271-83.

- Cohort, case-control, or randomized trial in generally healthy adults.1598 identified abstracts, 20 studies:17 prospective cohorts & 3 case-control. Random-effects generalized least squares models for trend estimation to derive pooled dose-response estimates. The 20 studies included 1,218, 380 individuals and 23,889 CHD, 2,280 stroke, and 10,797 DM cases.

RR of CHD per 50 g/d processed meat

Systematic review. Circulation 2010;121:2271-83.

Case-control

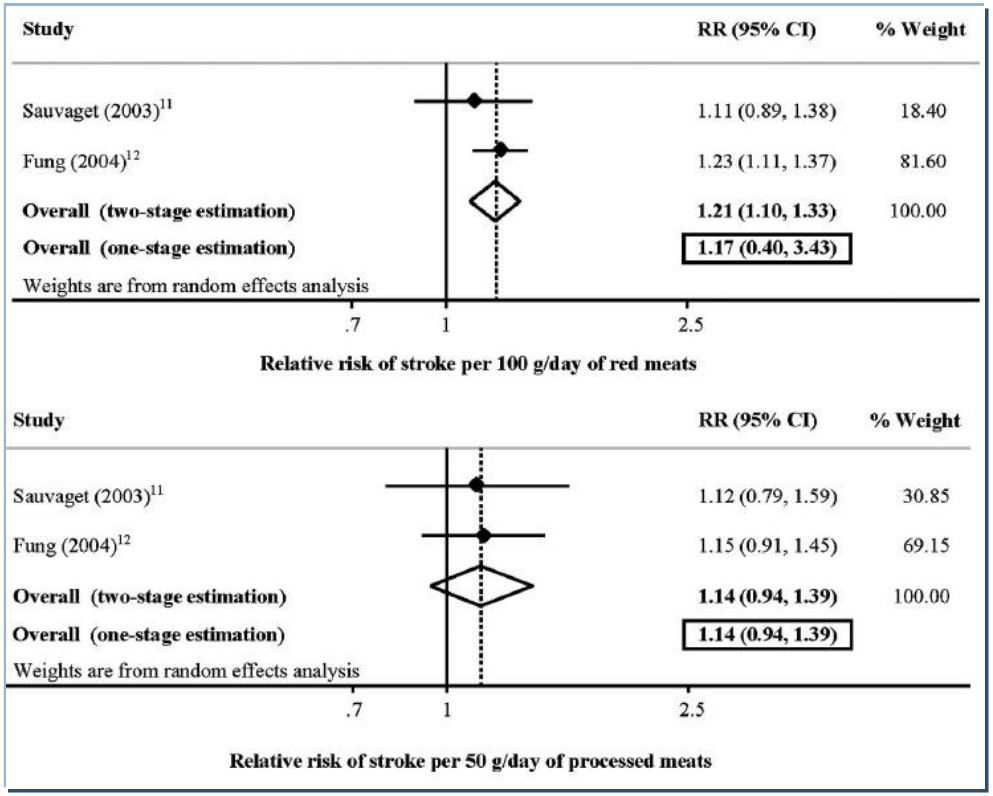


RR of CHD per 100 g/d total meat

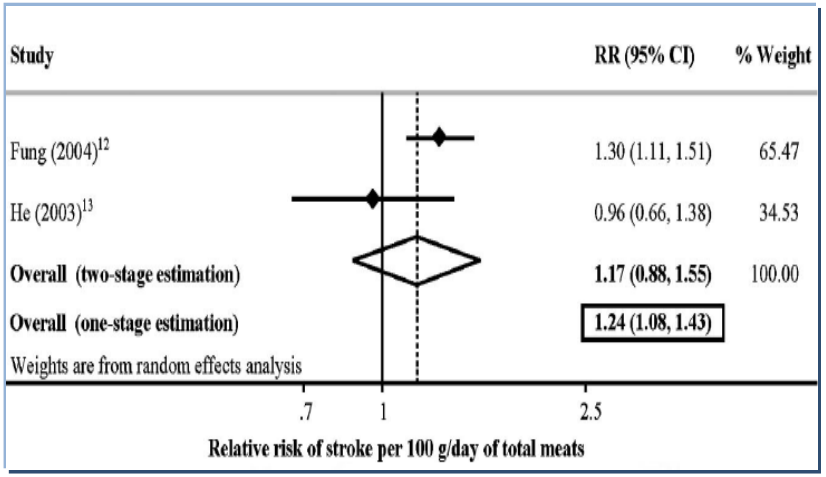
RR of stroke & meat intake: cohorts

Systematic review. Circulation 2010;121:2271-83.

RR of stroke/100 g/d red meat



RR of stroke/50 g/d processed meat



RR of stroke/100 g/d total meat

กินเบคอน ๒ แผ่น/ฮอดดอก ๑ ชิ้นต่อวัน เพิ่มโอกาสโรคเบาหวาน ~ ๒ เท่า

Systematic review. Circulation 2010;121:2271-83.

- Each serving (2 slices) per day of bacon was associated with a 2-fold higher incidence of diabetes mellitus (RR = 2.07; 95% CI, 1.40 to 3.04);
- Each serving of hot dogs (each 1 per day), with nearly a 2-fold higher incidence (RR = 1.92; 95% CI, 1.33 to 2.78),

American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Prevention

Reducing the Risk of Cancer With Healthy Food Choices and Physical Activity

- Limit consumption of processed meats and red meats.
  - Minimize consumption of processed meats such as bacon, sausage, luncheon meats, and hot dogs.
  - Choose fish, poultry, or beans as an alternative to red meat (beef, pork, and lamb).
  - If you eat red meat, select lean cuts and eat smaller portions.
  - Prepare meat, poultry, and fish by baking, broiling, or poaching rather than by frying or charbroiling.

Cancer J Clin 2012;62:30–67.

Red meat intake ↑all-cause death

Pan A. Arch Intern Med 2012; doi:10.1001/archinternmed.2011.2287

- Prospectively observed 37,698 men from Health Professionals Follow-up Study (1986-2008) & 83 644 women from Nurses' Health Study (1980-2008), free of CVD & cancer at baseline. Diet assessed by validated Food Frequency Questionnaires & updated every 4 yrs.
- 23,926 deaths (5910 CVD & 9464 cancer deaths) 2.96 million person-year follow-up

Red meat intake ↑all-cause death

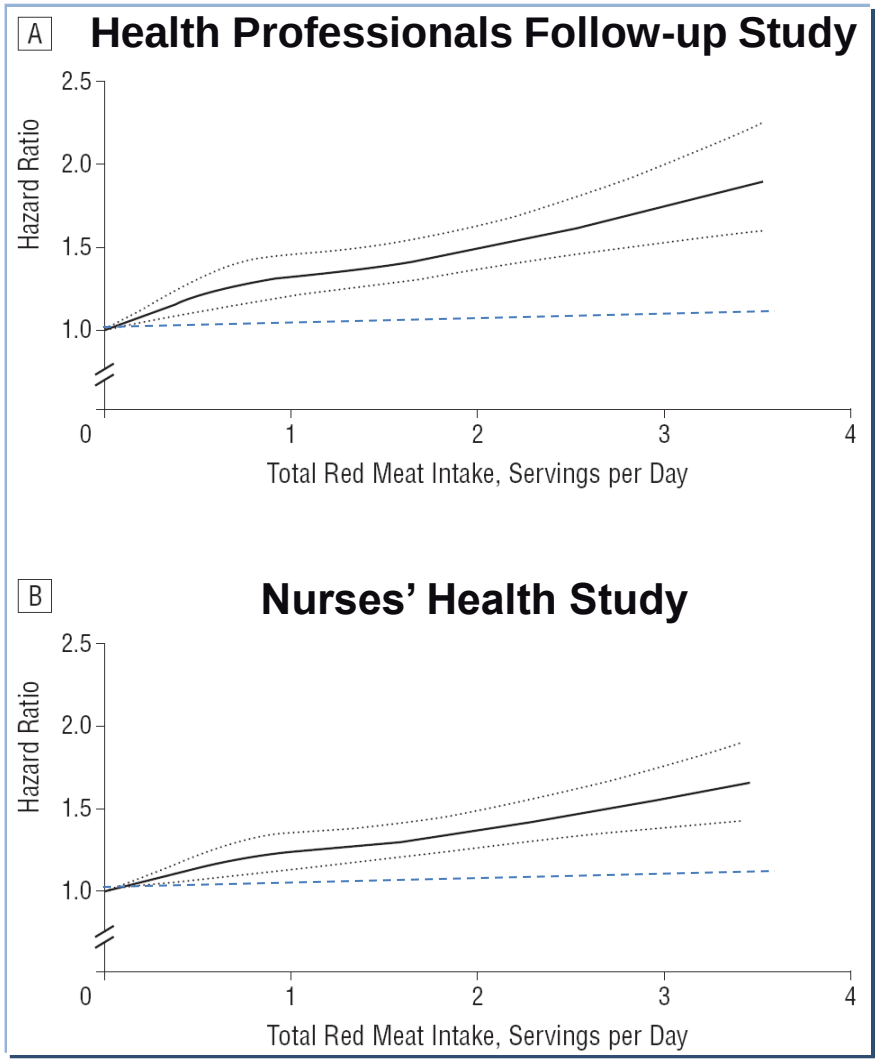
Pan A. Arch Intern Med 2012; doi:10.1001/archinternmed.2011.2287

Table 2. All-Cause Mortality According to Red Meat Intake in the Health Professionals Follow-up Study and the Nurses' Health Study

Variable	Frequency of Consumption Quintiles[a] Q1	Q2	Q3	Q4	Q5	*P* Value for Trend	HR (95% CI) for a 1-Serving-per-Day Increase
			Pooled Results[d]				
Total red meat	1 [Reference]	1.10 (1.05-1.14)	1.15 (1.06-1.26)	1.21 (1.14-1.28)	1.30 (1.18-1.43)	<.001	1.12 (1.09-1.15)
Unprocessed red meat	1 [Reference]	1.08 (1.05-1.12)	1.10 (1.03-1.17)	1.15 (1.05-1.25)	1.23 (1.14-1.34)	<.001	1.13 (1.07-1.20)
Processed red meat	1 [Reference]	1.05 (1.00-1.09)	1.11 (1.04-1.18)	1.15 (1.11-1.20)	1.23 (1.16-1.30)	<.001	1.20 (1.15-1.24)

Red meat intake ↑all-cause death

Pan A. Arch Intern Med 2012; doi:10.1001/archinternmed.2011.2287



- Pooled hazard ratio (95% CI) of total mortality for a 1-serving/day increase was 1.13 (1.07-1.20) for unprocessed red meat and 1.20 (1.15-1.24) for processed red meat.

Red meat intake ↑ CV death

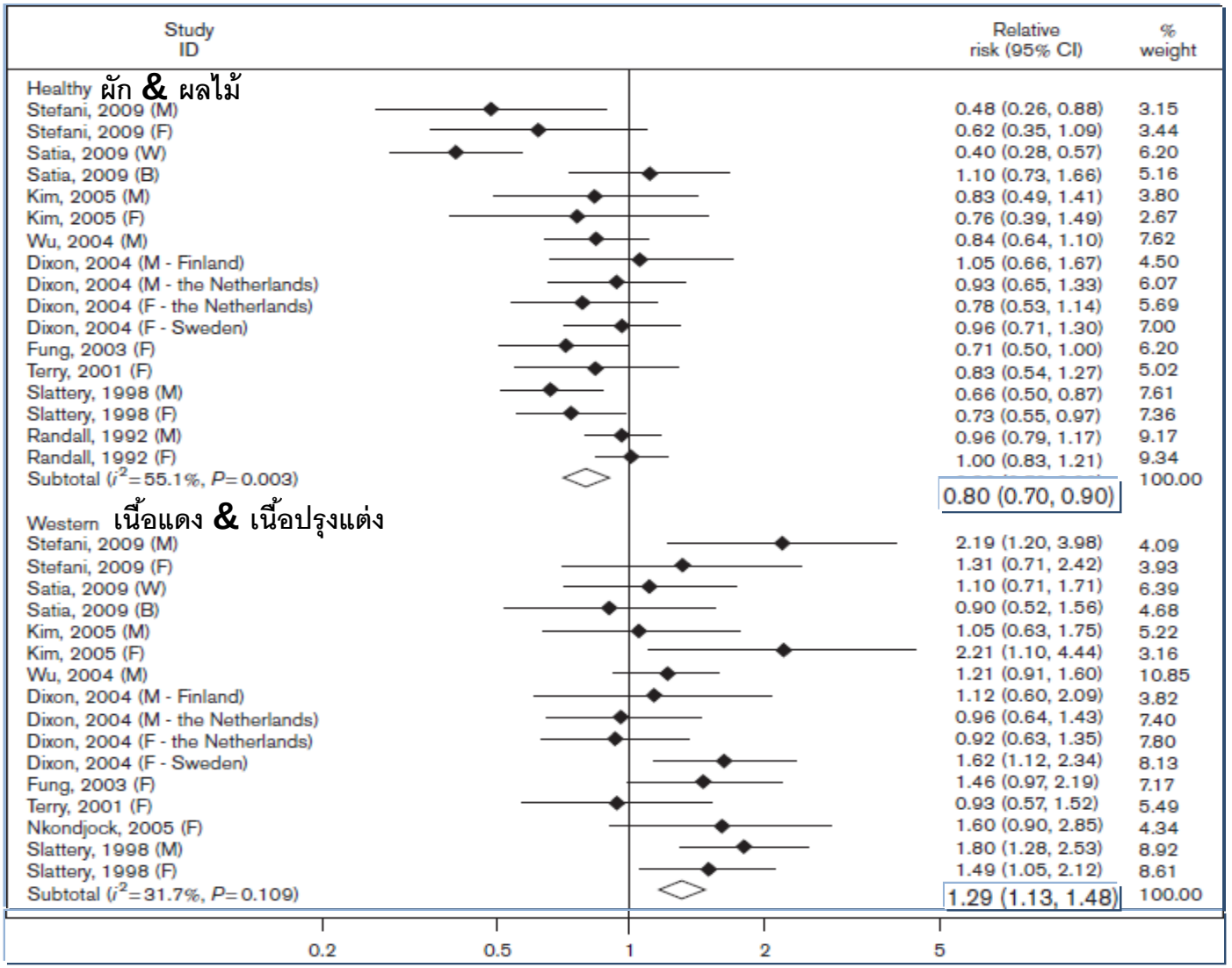
Pan A. Arch Intern Med 2012; doi:10.1001/archinternmed.2011.2287

Table 3. Cardiovascular Mortality According to Red Meat Intake in the Health Professionals Follow-up Study and the Nurses' Health Study

Variable	Frequency of Consumption Quintiles[a]					*P* Value for Trend	HR (95% CI) for a 1-Serving-per-Day Increase
	Q1	Q2	Q3	Q4	Q5		
	Pooled Results[c]						
Total red meat	1 [Reference]	1.12 (1.03-1.22)	1.13 (1.04-1.24)	1.23 (1.13-1.34)	1.40 (1.29-1.53)	<.001	1.16 (1.12-1.20)
Unprocessed red meat	1 [Reference]	1.16 (1.05-1.28)	1.09 (1.00-1.18)	1.17 (1.07-1.27)	1.36 (1.25-1.47)	<.001	1.18 (1.13-1.23)
Processed red meat	1 [Reference]	1.01 (0.92-1.10)	1.12 (1.03-1.22)	1.13 (1.04-1.23)	1.27 (1.18-1.38)	<.001	1.21 (1.13-1.31)

เนื้อแดง-ปรุงแต่ง↑(29%) , ผัก-ผลไม้↓(20%)มะเร็งลำไส้ใหญ่

Systematic Review. Magalhaes B.Eur J Cancer Prevent 2012;21:15.



2013 AHA/ACC Lifestyle Management Guideline

Eckel RH. Circulation. published online November 12, 2013.

Table 5. Summary of Recommendations for Lifestyle Management

Recommendations	NHLBI Grade	NHLBI Evidence Statements	ACC/AHA COR	ACC/AHA LOE
LDL–C - Advise adults who would benefit from LDL–C lowering* to:				
1. Consume a dietary pattern that emphasizes intake of vegetables, fruits, and whole grains; includes low-fat dairy products, poultry, fish, legumes, nontropical vegetable oils and nuts; and limits intake of sweets, sugar-sweetened beverages and red meats. a. Adapt this dietary pattern to appropriate calorie requirements, personal and cultural food preferences, and nutrition therapy for other medical conditions (including diabetes mellitus). b. Achieve this pattern by following plans such as the DASH dietary pattern, the USDA Food Pattern, or the AHA Diet.	A (Strong)	**CQ1:** ES4 (high), ES6 (low), ES8 (moderate), ES9 (moderate)	I	A
BP - Advise adults who would benefit from BP lowering to:				
1. Consume a dietary pattern that emphasizes intake of vegetables, fruits, and whole grains; includes low-fat dairy products, poultry, fish, legumes, nontropical vegetable oils and nuts; and limits intake of sweets, sugar-sweetened beverages and red meats. a. Adapt this dietary pattern to appropriate calorie requirements, personal and cultural food preferences, and nutrition therapy for other medical conditions (including diabetes mellitus). b. Achieve this pattern by following plans such as the DASH dietary pattern, the USDA Food Pattern, or the AHA Diet.	A (Strong)	**CQ1:** ES1 (low) ES3 (high), ES5 (high), ES6 (low), ES7 (low), ES8 (moderate)	I	A
2. Lower sodium intake.	A (Strong)	**CQ2:** ES1	I	A

ลดความดันฯ, ไขมันด้วย

*จำกัด หวาน มัน เกลือ เนื้อแดง

2013 AHA/ACC Lifestyle Management Guideline

Eckel RH. Circulation. published online November 12, 2013.

Heart Healthy Nutrition

The adult population should be encouraged to practice heart healthy lifestyle behaviors :

- ✓ Consume a dietary pattern that emphasizes intake of vegetables, fruits & whole grains; includes low-fat dairy products, poultry, fish, legumes, nontropical vegetable oils and nuts;
- ✘ Limits intake of sodium, sweets, sugarsweetened beverages and red meats.(หวาน มัน เกลือ เนื้อแดง)

พืชสด ลดเกลือ เนื้อน้อย ด้อยมัน น้ำตาลต่ำ

Dietary pattern in heart failure

Dietary Approaches to Stop Hypertension diet
& Mediterranean diet

Women's Health Initiative

Levitan EB. DOI: 10.1161/CIRCHEARTFAILURE.2013.113.000495

- 1993-1998, postmenopausal women aged 50-79 were recruited at 40 US clinical centers.
  - WHI Clinical Trial (CT) component 68,132 participants enrolled hormone therapy (HT), dietary modification (DM), and calcium plus vitamin D (CaD) trials,
  - Observational Study (OS) component n = 93,676
- WHI CT & OS ended in 2004-2005; participants were invited to continue in WHI Extension Study (ES)-1: 2005-2010 & ES-2: 2010-2015; 4,043 WHI CT and OS participants had a HF hospitalization

Women's Health Initiative

Levitan EB. DOI: 10.1161/CIRCHEARTFAILURE.2013.113.000495

Table 2. Mediterranean and DASH diet scores and mortality among women with heart failure

	Quartile 1	Quartile 2	Quartile 3	Quartile 4
DASH diet score				
N	768	704	956	787
Median (Range)	19 (9-21)	23 (22-24)	26 (25-28)	31 (29-40)
Deaths	345	329	386	325
Person-years	3,440	3,120	4,477	3,698
Mortality rate per 100 person-years	10.0	10.5	8.6	8.8
Model 1 HR (95% CI)*	1	1.00 (0.85-1.16)	0.77 (0.66-0.90)	0.75 (0.64-0.89)
Model 2 HR (95% CI)†	1	1.05 (0.90-1.23)	0.86 (0.73-1.02)	0.89 (0.75-1.05)
Model 3 HR (95% CI)‡	1	1.04 (0.89-1.21)	0.83 (0.70-0.98)	0.84 (0.70-1.00)

* Adjusted for age at heart failure hospitalization and total energy intake

† Adjusted for variables in Model 1 and race/ethnicity, education, income, married, current smoking, total exercise, physical function, use of off-study postmenopausal hormone therapy, and WHI study arm

‡ Adjusted for variables in Model 2 and systolic blood pressure, diastolic blood pressure, use of diuretics, beta-blockers, and angiotensin converting enzyme inhibitors or angiotensin receptor blockers, body mass index, and history of high cholesterol, high blood pressure, diabetes, myocardial infarction, coronary revascularization, and atrial fibrillation.

Women's Health Initiative

Levitan EB. DOI: 10.1161/CIRCHEARTFAILURE.2013.113.000495

Table 2. Mediterranean and DASH diet scores and mortality among women with heart failure

	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Mediterranean diet score				
N	572	1,305	589	749
Median (Range)	2 (0-2)	4 (3-4)	5 (5-5)	6 (6-9)
Deaths	260	587	248	290
Person-years	2,582	5,772	2,741	3,639
Mortality rate per 100 person-years	10.1	10.2	9.0	8.0
Model 1 HR (95% CI)*	1	1.00 (0.86-1.17)	0.88 (0.74-1.04)	0.75 (0.63-0.89)
Model 2 HR (95% CI)†	1	1.09 (0.93-1.28)	1.02 (0.85-1.22)	0.91 (0.75-1.09)
Model 3 HR (95% CI)‡	1	1.05 (0.89-1.24)	0.97 (0.81-1.17)	0.85 (0.70-1.02)

* Adjusted for age at heart failure hospitalization and total energy intake

† Adjusted for variables in Model 1 and race/ethnicity, education, income, married, current smoking, total exercise, physical function, use of off-study postmenopausal hormone therapy, and WHI study arm

‡ Adjusted for variables in Model 2 and systolic blood pressure, diastolic blood pressure, use of diuretics, beta-blockers, and angiotensin converting enzyme inhibitors or angiotensin receptor blockers, body mass index, and history of high cholesterol, high blood pressure, diabetes, myocardial infarction, coronary revascularization, and atrial fibrillation.

ผัก ข้าวกล้อง ถั่ว ลดโอกาสการตายในหญิงหัวใจล้มเหลว

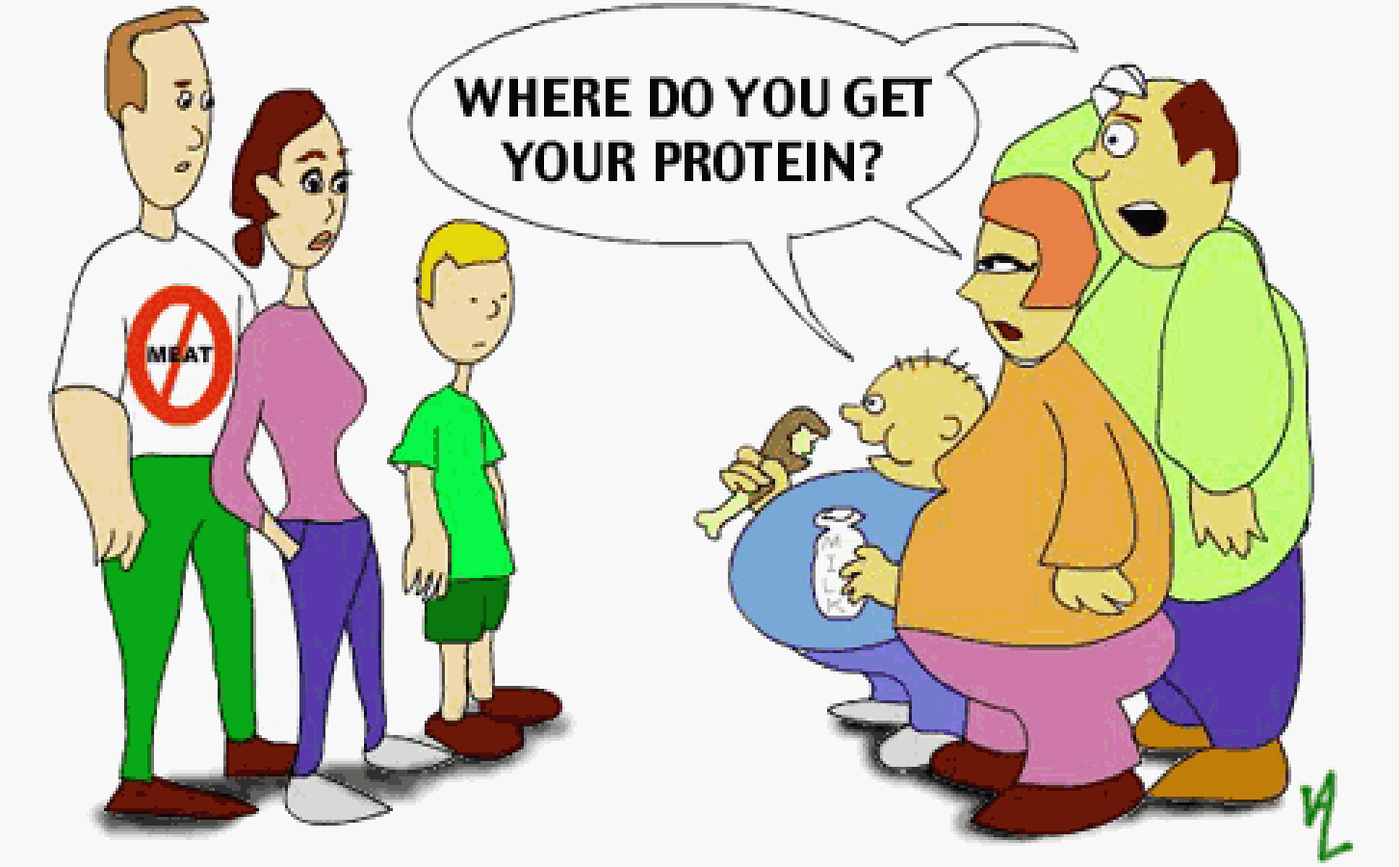
Vegetables, Nuts, Whole grain ↓ Death in HF

Levitan EB. DOI: 10.1161/CIRCHEARTFAILURE.2013.113.000495

Table 3. Components of the Mediterranean and DASH diet scores and mortality among women with heart failure*

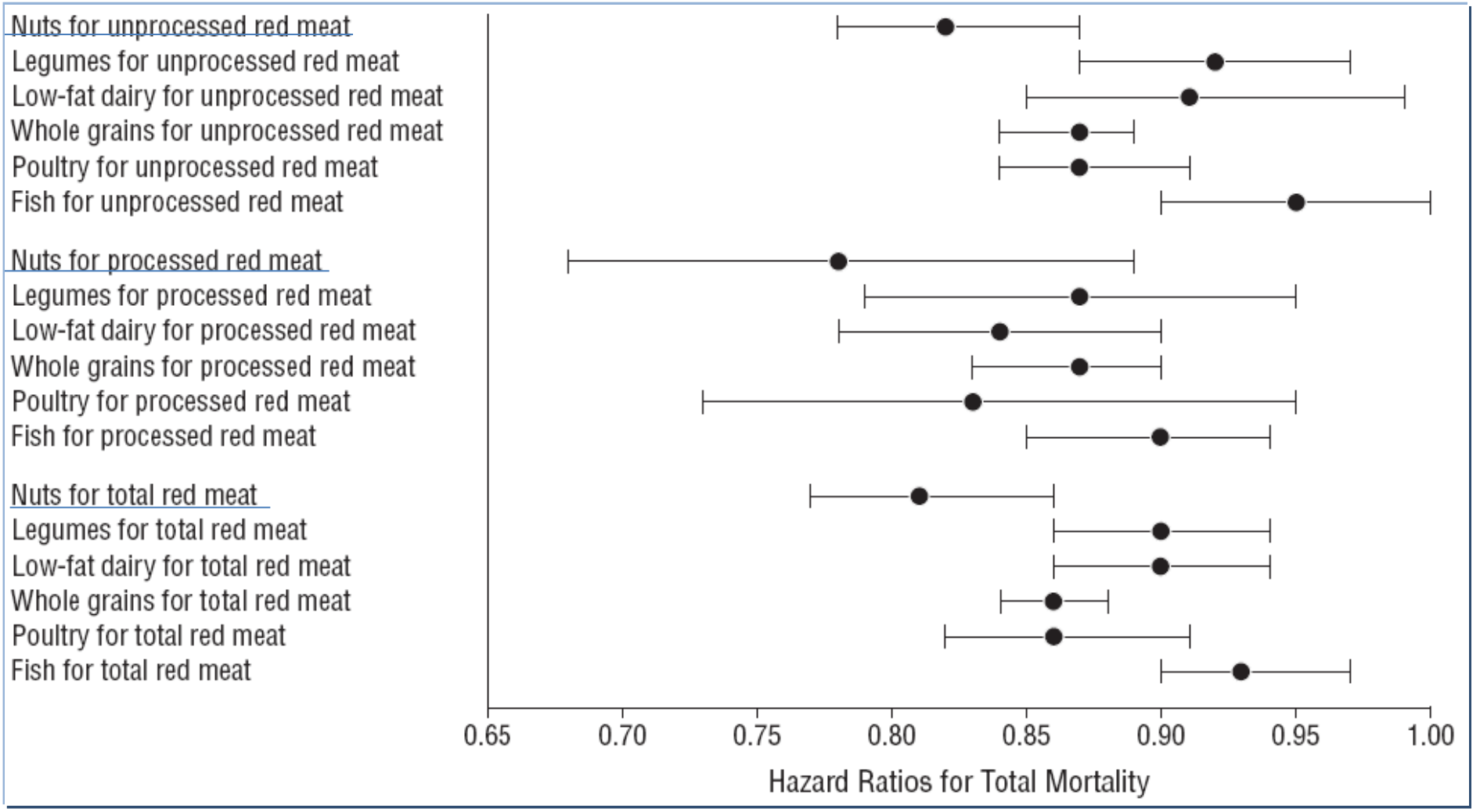
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	p-trend
Mediterranean diet score					
Fruits	1	1.06 (0.89-1.25)	1.06 (0.90-1.26)	1.05 (0.89-1.25)	0.67
Vegetables	1	0.95 (0.81-1.12)	0.97 (0.82-1.14)	0.81 (0.68-0.96)	0.01
Nuts	1	0.97 (0.83-1.14)	0.92 (0.81-1.06)	0.86 (0.74-0.96)	0.049
Legumes	1	1.01 (0.87-1.17)	0.98 (0.85-1.13)	0.95 (0.81-1.12)	0.49
Whole grains	1	0.91 (0.78-1.05)	0.82 (0.70-0.96)	0.79 (0.67-0.94)	0.005
Fish	1	1.00 (0.86-1.17)	1.01 (0.86-1.18)	1.00 (0.85-1.18)	0.98
Ratio of monounsaturated to saturated fat	1	0.91 (0.78-1.06)	1.06 (0.91-1.23)	0.91 (0.78-1.07)	0.51
Red and processed meat	1	0.97 (0.83-1.13)	0.95 (0.81-1.11)	1.13 (0.93-1.36)	0.16
Alcohol	1	1.02 (0.87-1.20)	0.99 (0.85-1.16)	0.94 (0.80-1.10)	0.32
DASH diet score					
Fruits	1	1.06 (0.89-1.25)	1.06 (0.90-1.26)	1.05 (0.89-1.25)	0.67
Vegetables	1	0.95 (0.81-1.12)	0.97 (0.82-1.14)	0.81 (0.68-0.96)	0.01
Nuts and legumes	1	0.87 (0.75-1.01)	0.90 (0.77-1.05)	0.81 (0.69-0.95)	0.03
Low-fat dairy	1	0.81(0.70-0.95)	0.84 (0.73-0.98)	0.83 (0.71-0.98)	0.11
Whole grains	1	0.91 (0.78-1.05)	0.82 (0.70-0.96)	0.79 (0.67-0.94)	0.005
Sodium	1	0.96 (0.82-1.12)	0.98 (0.84-1.14)	1.09 (0.94-1.28)	0.23
Sweetened beverages†	1	1.00 (0.85-1.18)	0.98 (0.85-1.13)		0.80
Red and processed meat	1	0.97 (0.83-1.13)	0.95 (0.81-1.11)	1.13 (0.93-1.36)	0.16

“แล้วพวกคุณไปเอา..โปรตีน..มาจากไหน ?”



Replacement for red meat ↓ all-cause death

Pan A. Arch Intern Med 2012; doi:10.1001/archinternmed.2011.2287



Egg consumption & CVD: No association

Prospective Mediterranean cohort. Zazpe I. Eur J Clin Nutr 2011;65:676.

- 14,185 university graduates.
- Baseline egg intake: 136-item-validated food-frequency questionnaire, cardiovascular risk factors: questionnaire, incidence of CVD (MI, revascularization procedures or stroke): biennial medical records assessments.
- Median follow-up 6.1 years: 91 new confirmed cases of CVD.

Egg consumption & CVD: No association

Prospective Mediterranean cohort. Zazpe I. Eur J Clin Nutr 2011;65:676.

		Egg consumption		
	< 1/week	1/week	2–4/week	> 4/week
Incident cases of CVD	11	16	53	11
Multivariable 1	1 (ref.)	0.77 (0.36–1.67)	0.99 (0.51–1.91)	1.10 (0.45–2.52)
Multivariable 2	1 (ref.)	0.78 (0.36–1.69)	0.99 (0.51–1.95)	1.08 (0.45–2.59)
Multivariable 3	1 (ref.)	0.78 (0.36–1.70)	1.00 (0.51–1.97)	1.10 (0.46–2.63)

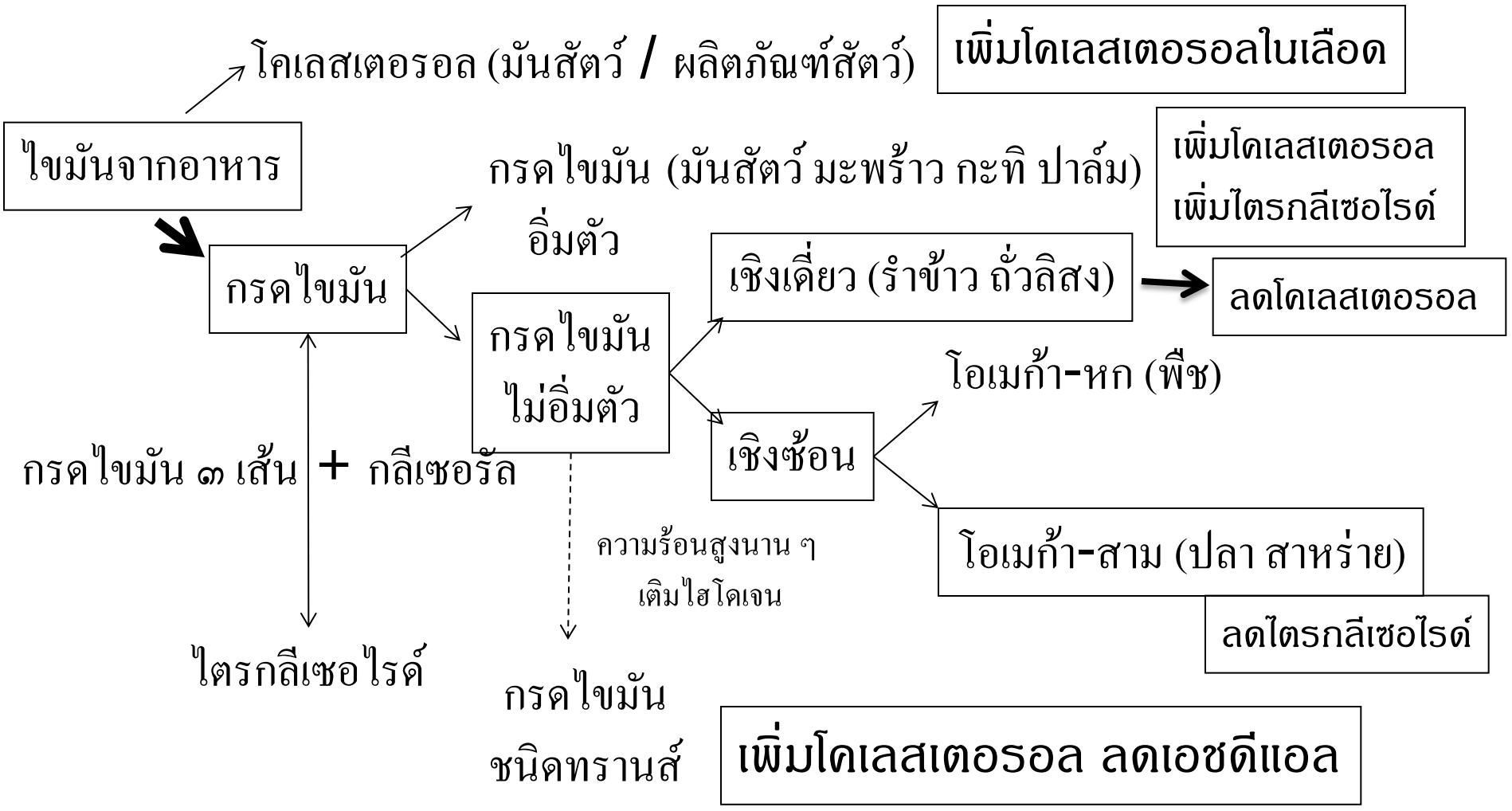
Abbreviations: CI, confidence interval; CVD, cardiovascular disease; HR, hazard ratio.

Multivariable 1: adjusted for age (continuous), sex and total energy intake (continuous).

Multivariable 2: additionally adjusted for adherence to the Mediterranean food pattern (three categories).

Multivariable 3: additionally adjusted for alcohol intake (four categories), baseline BMI (kg/m^2, continuous), smoking status (three categories), physical activity during leisure time (MET-h/week, continuous), family history of CVD (yes/no), self-reported diabetes (yes/no), self-reported hypertension (yes/no) and self-reported hypercholesterolemia (yes/no).

Fat: bad, better or best


โคเลสเตอรอล (มันสัตว์ / ผลิตภัณฑ์สัตว์)
เพิ่มโคเลสเตอรอลในเลือด
ไขมันจากอาหาร
กรดไขมัน (มันสัตว์ มะพร้าว กะทิ ปาล์ม)
เพิ่มโคเลสเตอรอล
เพิ่มไตรกลีเซอไรด์
อิ่มตัว
กรดไขมัน
กรดไขมัน
ไม่อิ่มตัว
เชิงเดี่ยว (รำข้าว ถั่วลิสง)
ลดโคเลสเตอรอล
โอเมก้า-หก (พืช)
เชิงซ้อน
กรดไขมัน ๓ เส้น + กลีเซอรัล
โอเมก้า-สาม (ปลา สาหร่าย)
ความร้อนสูงนาน ๆ
เติมไฮโดเจน
ลดไตรกลีเซอไรด์
ไตรกลีเซอไรด์
กรดไขมัน
ชนิดทรานส์
เพิ่มโคเลสเตอรอล ลดเอชดีแอล

Trans fatty acid & coronary heart disease:

Zutphen Elderly Study. Oomen CM. Lancet 2001; 357: 746-51

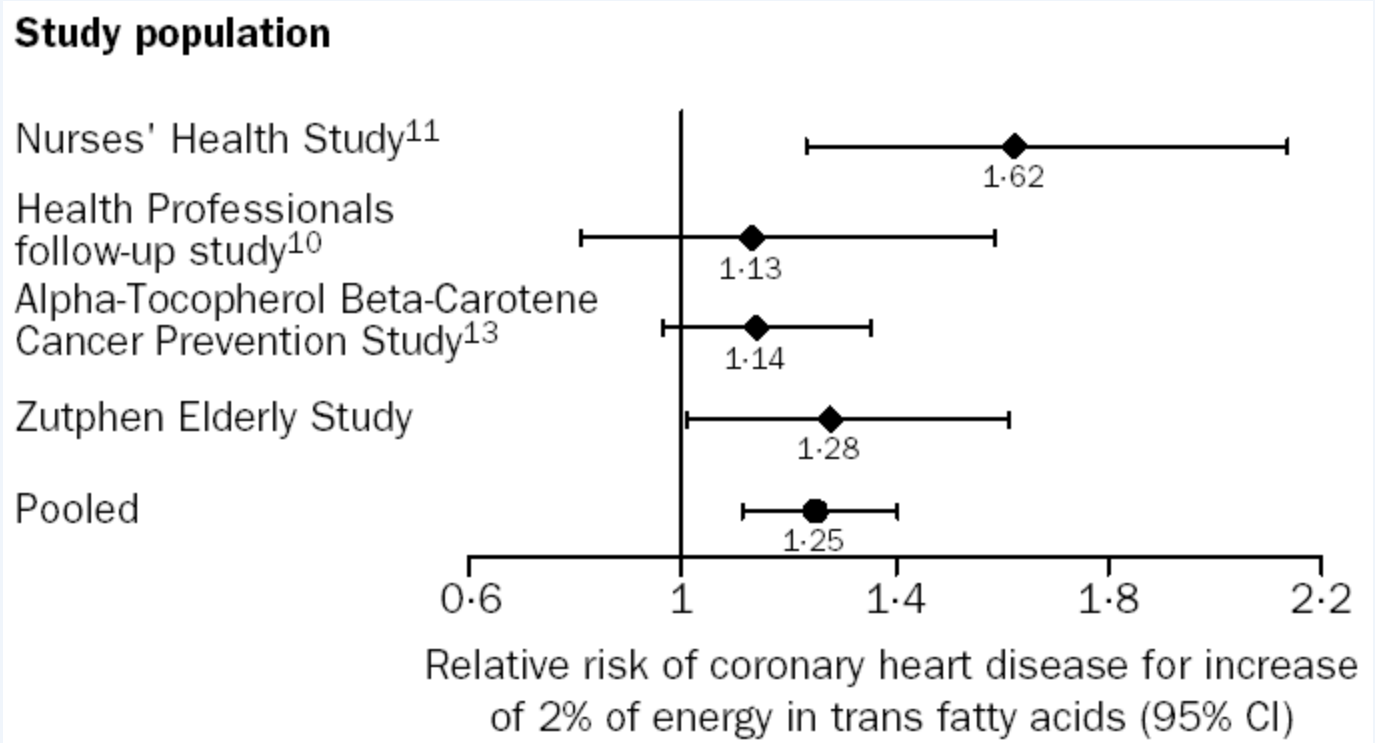
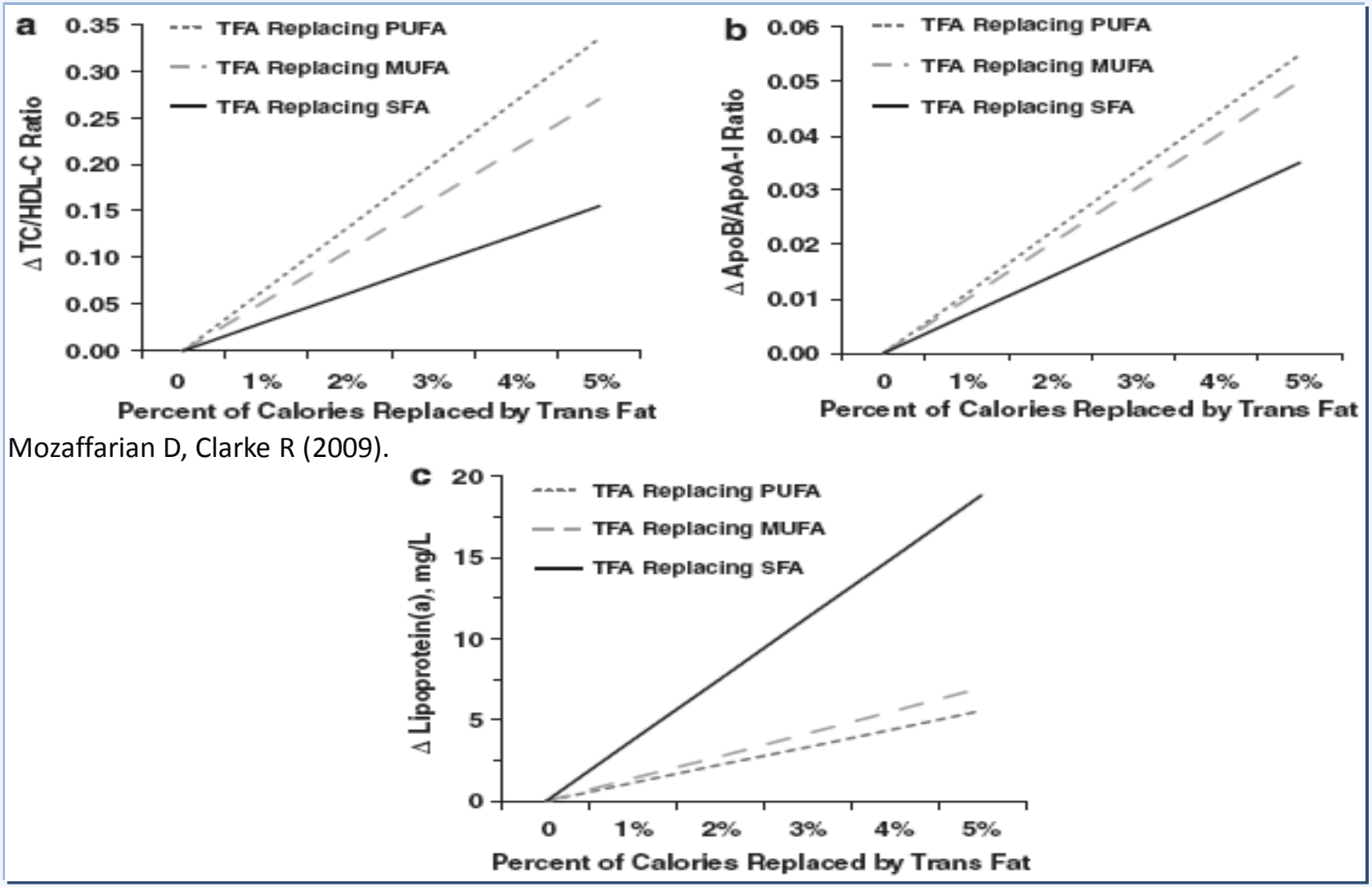


Figure 2: **The fully adjusted relative risks of coronary heart disease for an increase of 2% of energy in trans fatty acid intake at baseline according to prospective population-based studies and the pooled variance-weighted relative risk**

Trans Fatty Acid: the worst FA for CHD

HMS. Mozaffarian D. Eur J Clin Nutr 2009;63:S5-S21.



Mozaffarian D, Clarke R (2009).

Trans fat & SCD risk in women

Nurses' Health Study. Chiuve SE. Am Heart J 2009;158:761-7.

- Prospectively examined association between dietary trans fat & Sudden Cardiac Death (n = 86,762 women, 30-55 yr in 1976).
- Coronary Heart Disease risk factors:diet and lifestyle factors, updated via questionnaires every 2 - 4 yrs, beginning in 1980.
- Follow up > 26 yrs,317 SCD events.
- Result: no significant association. However…

Trans fat may↑ SCD risk in CHD women

Nurses' Health Study. Chiuve SE. Am Heart J 2009;158:761-7.

Table V. Relative risks (95% CIs) of sudden cardiac death according to *trans* fat intake stratified by history of nonfatal CHD before event

	Quintiles of total *trans* fat (% energy)					*P* trend
Total *trans* (median intake, % energy)	0.77	1.12	1.43	1.83	2.55	
Prior history of CHD						
Cases	23	27	18	15	17	
Person-years	46 732	38 520	32 875	26 127	19 251	
Age and energy adjusted	*1.0 (ref)*	1.38 (0.78-2.45)	1.31 (0.70-2.47)	1.59 (0.80-3.15)	3.07 (1.52-6.23)	.004
Multivariate adjusted*	*1.0 (ref)*	1.78 (0.96-3.31)	1.53 (0.76-3.08)	1.90 (0.87-4.15)	3.24 (1.42-7.40)	.01
No prior history of CHD						
Cases	46	50	41	46	34	
Person-years	397 022	404 630	411 546	420 833	431 256	
Age and energy adjusted	*1.0 (ref)*	1.25 (0.83-1.87)	1.12 (0.73-1.71)	1.51 (0.98-2.31)	1.41 (0.87-2.30)	.12
Multivariate adjusted*	*1.0 (ref)*	1.04 (0.69-1.58)	0.84 (0.53-1.32)	1.01 (0.64-1.61)	0.86 (0.50-1.47)	.60

* Multivariate adjusted: model adjusted for age, total energy intake, smoking, BMI, parental history of MI, menopausal status, use of postmenopausal hormones, aspirin use, multivitamin and vitamin E supplements, moderate to vigorous activity, alcohol intake, intake of ω-3 fatty acid, α-linolenic fatty acids and ratio of polyunsaturated to saturated fatty acids, and diagnosis of stroke, diabetes, high blood pressure, or high cholesterol.

The NEW ENGLAND JOURNAL of MEDICINE

HEALTH LAW, ETHICS, AND HUMAN RIGHTS

New York City's War on Fat

Michelle M. Mello, J.D., Ph.D.

N Engl J Med 2009;360:2015-20

Ban on Trans fat

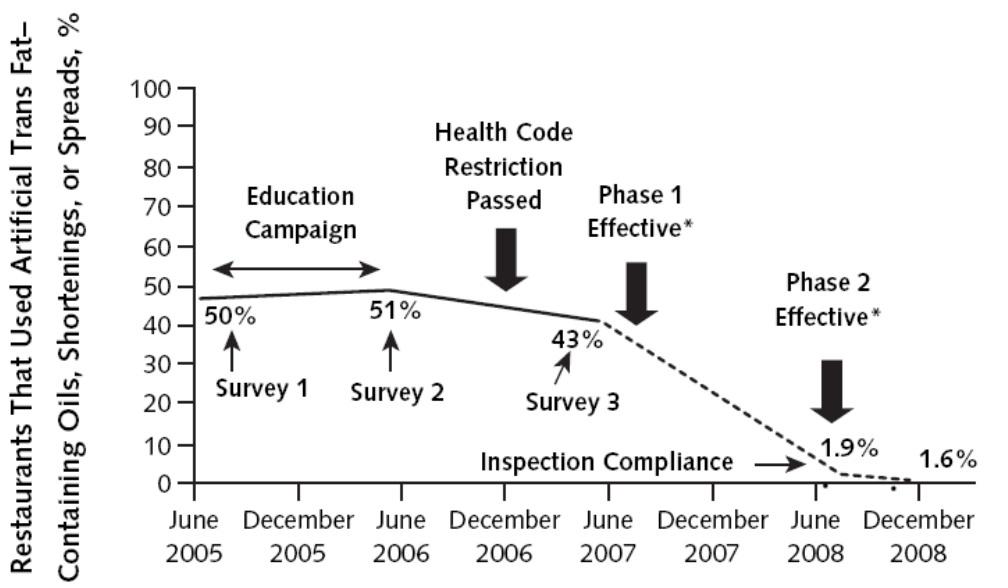
Mello MM.N Engl J Med 2009;360:2015-20

- New York City: ~2 million overwt, 1 m. obese, ~200000 un-Dx DM, 23,000 CHD death (2004), 1/3 New Yorker purchased meals >1000 Cal/d from chain restaurants (2007)
- Dec 5, 2006, board of health imposed two-stage phase-out of trans fat in all food-service establishments, enforceable fines $200-2,000.
- Until July 1, 2007, most oils, shortenings & margarine < 0.5 g of trans fat per serving.

New York City's trans fat restriction

Angell SY. Ann Intern Med 2009;151:129-134.

Figure. **New York City restriction of artificial trans fat: reduction in use in frying, baking, or cooking or in spreads.**



Data limited to use of artificial trans fat in oils, shortenings, and spreads (for which trans fat content could be determined) in New York City–licensed food service establishments by users of these products. Data from 2005 to 2007 are from surveys. July and November 2008 data are based on restaurant compliance data collected during regularly scheduled inspections. Compliance data are further adjusted to be consistent with survey denominator.

* Phase 1 of the regulation only covered fats used for frying or as a

วัยหมดประจำเดือนกินไขมันไม่อิ่มตัวเชิงซ้อน↑มะเร็งเต้านม **23%**

Meta-analysis. Turner L. Am J Hum Biology 2011;23:601

TABLE 4. Rate ratios (and 95% CIs) for the comparison of the highest with the lowest quartile for developing breast cancer because of increasing total fat, saturated fat, monounsaturated fat, and polyunsaturated fat intake

	N	RR	95%-CI	Significance
Pooled study type and menopausal status				
Total Fat	52	1.011	0.99; 1.03	NS
Saturated Fat	27	1.000	0.95; 1.05	NS
Monounsaturated Fat	23	0.999	0.95; 1.05	NS
Polyunsaturated Fat	20	1.069	1.01; 1.14	0.03
Cohort post-menopausal status				
Total Fat	16	1.045	1.01; 1.08	0.005
Saturated Fat	11	1.008	0.93; 1.09	NS
Monounsaturated Fat	10	1.009	0.93; 1.09	NS
Polyunsaturated Fat	9	1.229	1.09; 1.39	0.001

Sugar intake and CV health

Glycemic Index, Glycemic Load & chronic disease risk . Barclay AW. Am J Clin Nutr 2008;87:627-37

- **Systematic review** of 37 prospective cohort studies of GI/GL and chronic disease risk.
- Rate Ratios were estimated in a Cox proportional hazards model & combined by using a random-effects model.
- 4 - 20 y of follow-up, total 40,129 incident cases.

Rate ratio(95%CI) highest vs. lowest GI & GL in 27 cohorts. **Systematic review** Barclay AW. Am J Clin Nutr 2008;87:627-37

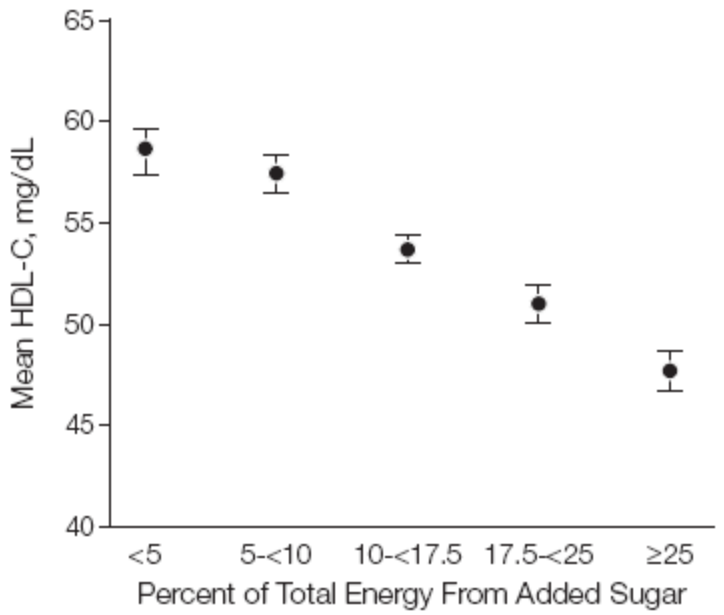
Chronic disease	Glycemic index rate ratio[1]	*P*	Glycemic load rate ratio[1]	*P*
Type 2 diabetes (6–11)	1.40 (1.23, 1.59)	<0.0001	1.27 (1.12, 1.45)	<0.0001
Heart disease (14, 16)	1.25 (1.00, 1.56)	0.050	1.57 (0.87, 2.84)	0.140
Stroke (15)	1.02 (0.86, 1.21)	0.805	1.28 (0.83, 1.98)	0.270
Breast cancer (17–19, 21, 30)	1.09 (1.02, 1.16)	0.015	0.99 (0.92, 1.06)	0.797
Colorectal cancer (23, 29, 34, 35)	1.11 (0.99, 1.24)	0.059	1.11 (0.88, 1.40)	0.385
Pancreatic cancer (11, 24)	0.98 (0.78, 1.25)	0.896	0.96 (0.75, 1.23)	0.733
Endometrial cancer (26, 32)	1.13 (0.80, 1.60)	0.489	1.72 (0.75, 3.95)	0.204
Gastric cancer (28)	0.77 (0.46, 1.29)	0.320	0.76 (0.46, 1.25)	0.282
Gallbladder disease (38, 39)	1.26 (1.13, 1.40)	<0.0001	1.41 (1.25, 1.60)	<0.0001
Eye disease (40–42)	1.10 (0.91, 1.31)	0.323	0.96 (0.82, 1.12)	0.590
All diseases (6–11, 14–19, 21, 23 38–42)	1.14 (1.09, 1.19)	<0.0001	1.09 (1.04, 1.15)	<0.0001

[1] Final fully adjusted models only.

Dietary added sugar & HDL, TG

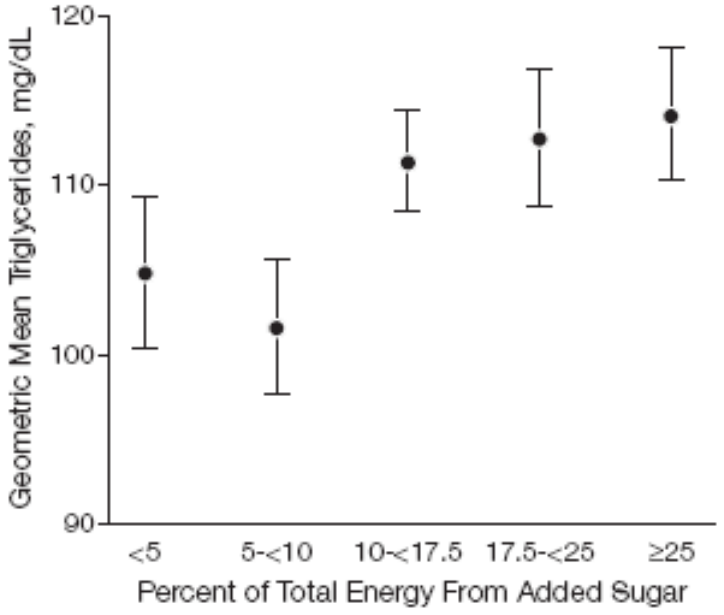
NHANES 1999-2006 (n=6113).Welsh JA. JAMA 2010;303:1490-97

Figure 1. Multivariable-Adjusted Mean HDL-C Levels by Level of Added Sugar Intake Among US Adults, NHANES 1999-2006



Participants grouped by percentage of total energy intake from added sugar; <5% comprises the reference group. $P < .001$ for linear trend. Error bars indicate 95% confidence intervals. HDL-C indicates high-

Figure 2. Multivariable-Adjusted Geometric Mean Triglyceride Levels by Level of Added Sugar Intake Among US Adults, NHANES 1999-2006



Participants grouped by percentage of total energy intake from added sugar; <5% comprises the reference group. $P = .02$ for linear trend. Error bars indicate 95% confidence intervals. NHANES indicates National Health and Nutrition Examination Survey. To

Diet & Exercise CHD 2^{ry} prevention

Systematic review. Cole JA.Cardiol Res Pract 2011doi:10.4061/2011/232351

- Aimed to determine effectiveness & included randomized controlled trials of lifestyle interventions, in 1^{ry} care or community settings, minimum FU 3 months, published since 1990.
- 21 trials with 10,799 patients were included
- Interventions: multifactorial (10), educational (4), psychological (3), dietary (1), organisational (eg, case managment) (2) & exercise (1).

Diet & Exercise: ↓all cause mortality

Systematic review. Cole JA.Cardiol Res Pract 2011doi:10.4061/2011/232351

Study or Subgroup	Intervention Events	Intervention Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Cupples and McKnight 1999	47	342	65	346	18.2%	0.73 [0.52, 1.03]
De Lorgeril 1999	14	219	24	204	5.4%	0.54 [0.29, 1.02]
Giannuzzi 2008	34	1620	43	1621	10.9%	0.79 [0.51, 1.23]
Hamalainen 1995	41	188	56	187	17.7%	0.73 [0.51, 1.03]
Munoz 2007	31	515	36	468	10.0%	0.78 [0.49, 1.24]
Murchie 2003	100	673	128	670	37.8%	0.78 [0.61, 0.99]
Total (95% CI)		3557		3496	100.0%	0.75 [0.65, 0.87]
Total events	267		352			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 1.22$, $df = 5$ ($P = .94$); $I^2 = 0\%$

Test for overall effect: $Z = 3.89$ ($P = .0001$)

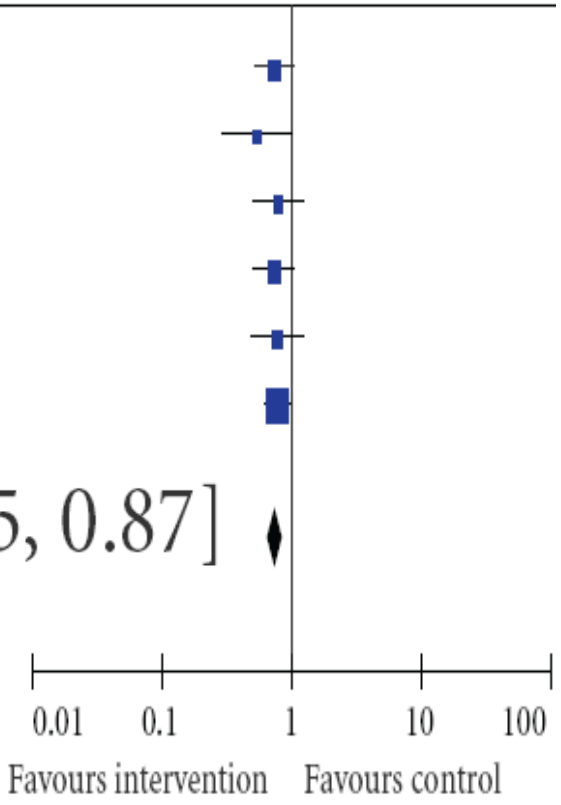
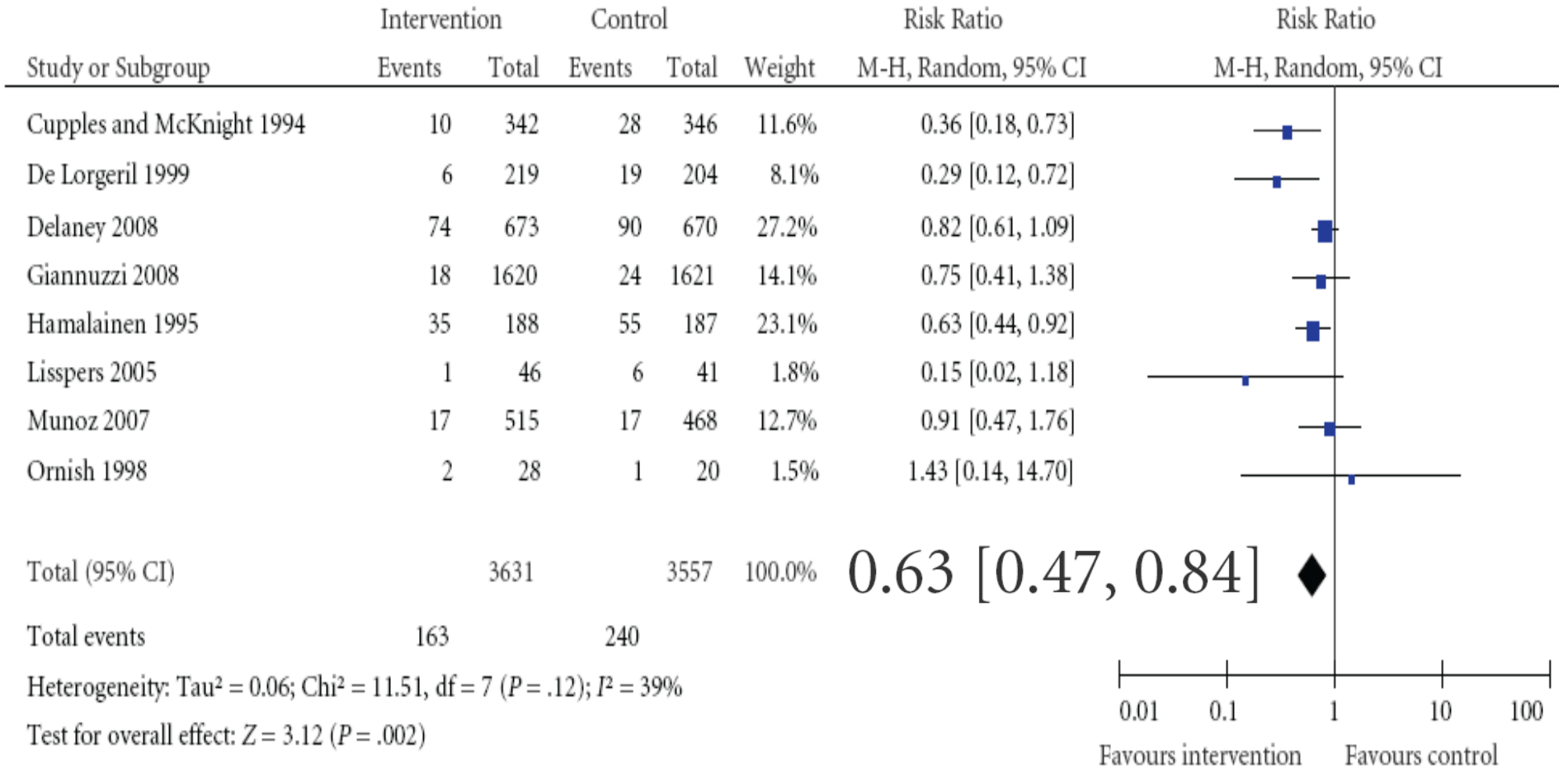


FIGURE 2: Effect of interventions on all-cause mortality: comparison of intervention versus control groups.

Diet & Exercise: ↓CV mortality

Systematic review. Cole JA.Cardiol Res Pract 2011doi:10.4061/2011/232351



Study or Subgroup	Intervention Events	Intervention Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Cupples and McKnight 1994	10	342	28	346	11.6%	0.36 [0.18, 0.73]
De Lorgeril 1999	6	219	19	204	8.1%	0.29 [0.12, 0.72]
Delaney 2008	74	673	90	670	27.2%	0.82 [0.61, 1.09]
Giannuzzi 2008	18	1620	24	1621	14.1%	0.75 [0.41, 1.38]
Hamalainen 1995	35	188	55	187	23.1%	0.63 [0.44, 0.92]
Lisspers 2005	1	46	6	41	1.8%	0.15 [0.02, 1.18]
Munoz 2007	17	515	17	468	12.7%	0.91 [0.47, 1.76]
Ornish 1998	2	28	1	20	1.5%	1.43 [0.14, 14.70]
Total (95% CI)		3631		3557	100.0%	0.63 [0.47, 0.84]
Total events	163		240			

Heterogeneity: $Tau^2 = 0.06$; $Chi^2 = 11.51$, $df = 7$ ($P = .12$); $I^2 = 39\%$

Test for overall effect: $Z = 3.12$ ($P = .002$)

FIGURE 3: Effect of interventions on cardiovascular mortality: comparison of intervention versus control groups.

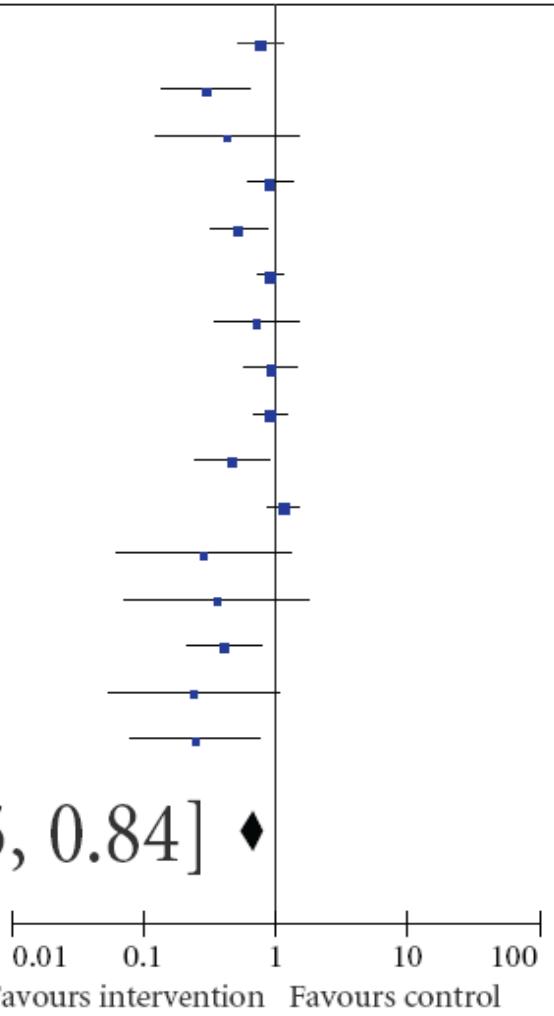
Diet & Exercise: ↓non-fatal H. event

Systematic review. Cole JA.Cardiol Res Pract 2011doi:10.4061/2011/232351

Study or Subgroup	Intervention Events	Intervention Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
DeLorgeril1999 MIRevasc	37	219	45	204	9.3%	0.77 [0.52, 1.13]
DeLorgeril1999 nonfatalMI	8	219	25	204	4.7%	0.30 [0.14, 0.65]
Giallauria 2009	3	26	7	26	2.3%	0.43 [0.12, 1.48]
Giannuzzi2008 CABG	45	1620	50	1621	9.2%	0.90 [0.61, 1.34]
Giannuzzi2008 nonfatal MI	23	1620	44	1621	7.7%	0.52 [0.32, 0.86]
Giannuzzi2008 PCI	144	1620	159	1621	12.2%	0.91 [0.73, 1.12]
Heller1993 C/angioplasty	11	213	17	237	5.0%	0.72 [0.35, 1.50]
Heller1993 CABG	29	213	35	237	8.3%	0.92 [0.58, 1.45]
Heller1993 cardcatheter	60	213	73	237	11.0%	0.91 [0.69, 1.22]
Lisspers 2005	10	46	19	41	6.0%	0.47 [0.25, 0.89]
Munoz 2007	92	515	73	468	11.1%	1.15 [0.87, 1.52]
Ornish1998 CABG	2	28	5	20	1.6%	0.29 [0.06, 1.33]
Ornish1998 nonfatal MI	2	28	4	20	1.5%	0.36 [0.07, 1.76]
Ornish1998 PTCA	8	28	14	20	5.8%	0.41 [0.21, 0.78]
Southard 2003	2	53	8	51	1.7%	0.24 [0.05, 1.08]
Wallner 1999	3	28	14	32	2.6%	0.24 [0.08, 0.77]
Total (95% CI)		6689		6660	100.0%	0.68 [0.55, 0.84]
Total events	479		592			

Heterogeneity: Tau² = 0.08; Chi² = 35.36, df = 15 (P = .002); I^2 = 58%

Test for overall effect: Z = 3.66 (P = .0003)



Diet, Exercise & smoking interventions

Systematic review. Cole JA.Cardiol Res Pract 2011doi:10.4061/2011/232351

Table 5: Summary of lifestyle risk findings.

Outcome	Number of studies with this outcome	Number of outcomes	Number significantly improved	Number of outcomes with no significant difference
Exercise	21	37	20 **(54.1%)**	17
Diet	15	51	39 **(76.5%)**	12
Smoking	13	20	7 **(35.0%)**	13

Note: we counted Campbell and Murchie as separate studies as the patients in each were not necessarily the same. Other follow-up studies, Cupples, Ornish, Vestfold, and Redfern we counted as one study but counted the outcomes from each time point as different outcomes (hence the 20 outcomes for the 13 studies reporting smoking outcomes).

Take home message: ห่อกลับบ้าน

- **พืชสด**(ผักสด ๒ ฝ่ามือ/มื้อ ผลไม้สด ล้างปาก)
- **ลดเกลือ**(น้ำปลา ครึ่ง ถึง ๑ ช้อนโต๊ะ ต่อมื้อ)
- **เนื้อน้อย**(ลดเนื้อแดง[๑๗ บาท/มื้อ] เลี่ยงปรุงแต่ง)
- **ด้อยมัน**(ลดไขมันชนิดทรานส์**[<๑%]** ใช้น้ำมันรำข้าว)
- **น้ำตาลต่ำ**(พอดีที่ ๖ ช้อนชา/วัน)
- **ธรรมชาติ**(ดีกว่า ปรุงแต่ง)
- **ปราศจากภัย**(ระวังของแถม)

Green Food
Good Taste
Best for your heart !!

You are what you eat..