Moderate consumption of fermented beverages and its effect on cardiometabolic risk

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Beer and Health

THE 8TH EUROPEAN

BEER AND HEALTH SYMPOSIUM

Diet & Health: a historical adventure

The role of diet on human health was known even from the ancient years.

Hippocrates said (460 BC) :

«Good health is a matter of the body composition (… genetics?) as well as the foods consumed, both fresh or processed...»

500 – 400 BC

Epidemiologic evidence suggests the important role of food preservation and preparation on health

1900

First evidence for the role of dietary patterns on CVD risk; the Seven Countries Study

1960-70

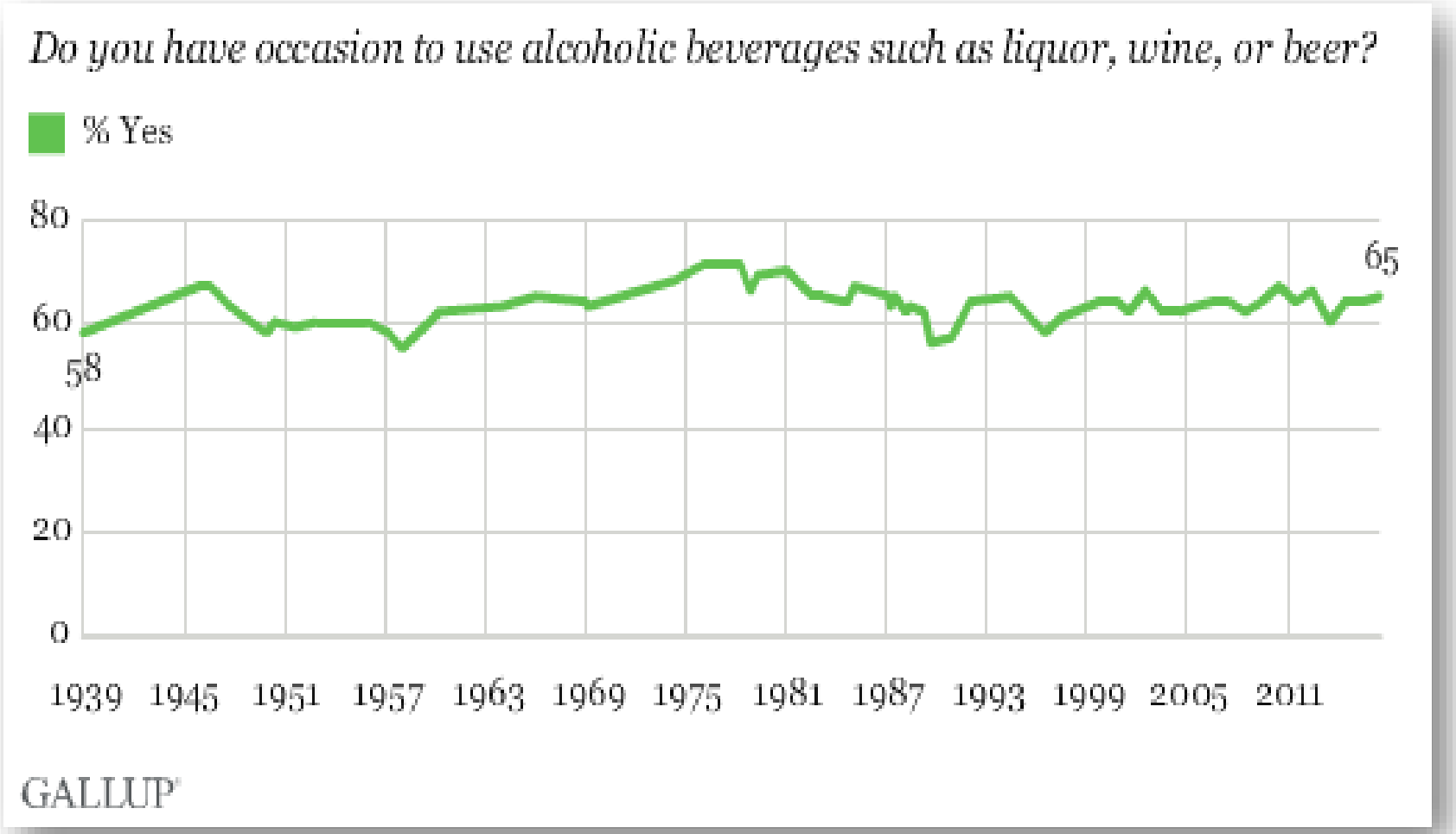
Observational studies and RCTs have established the role of diet on CVD, some types of cancer and other diseases

1990-2010

Alcohol drinking in the World

- Discovery of late Stone Age jugs suggest that
  - **intentionally fermented beverages existed at least as early as the Neolithic period** (cir. 10,000 BC).
- **Beer was the major beverage among the Babylonians**,
  - as early as 2700 BC they worshiped a wine goddess and other wine deities. Babylonians regularly used both beer and wine as offerings to their gods.
    - Around 1750 BC, the famous **Code of Hammurabi** devoted attention to alcohol. However, there were no penalties for drunkenness.

Alcohol consumption in the world



Alcohol consumption in the world

Figure 2. Total alcohol per capita consumption (15+ years; in litres of pure alcohol), 2010

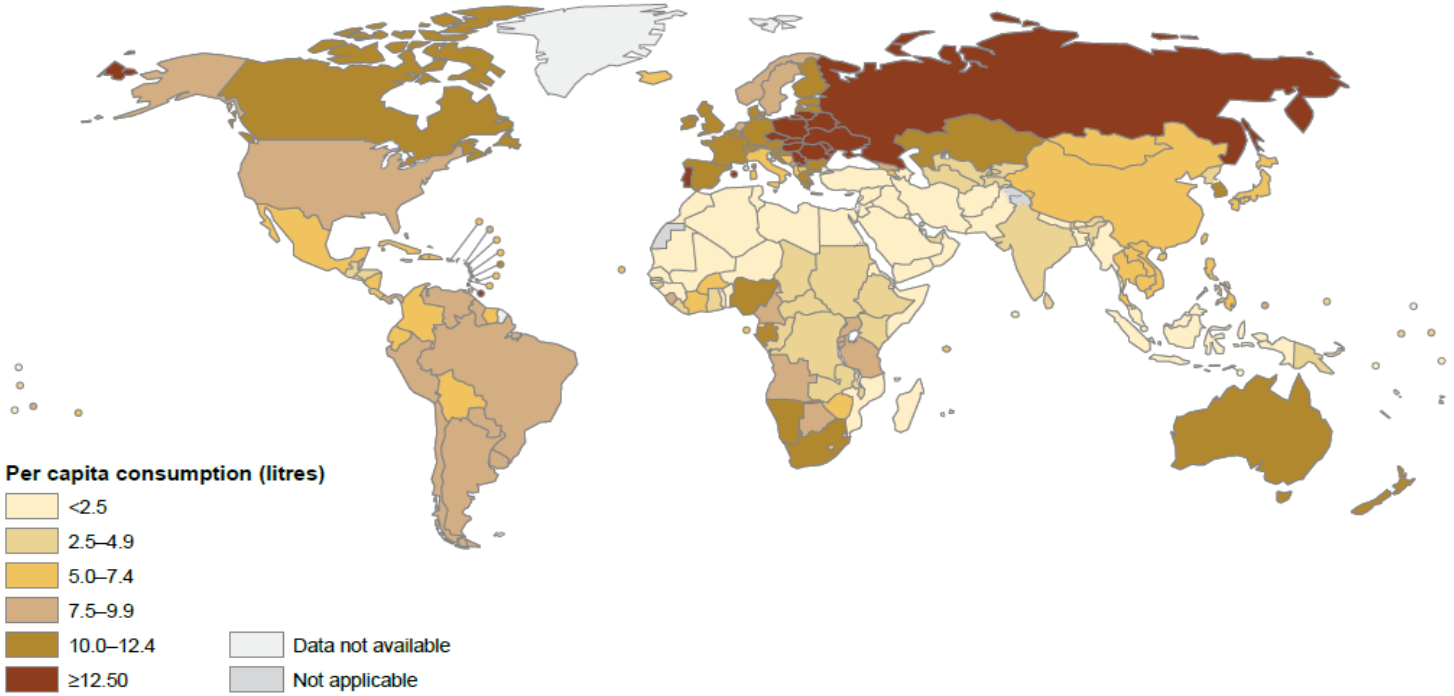
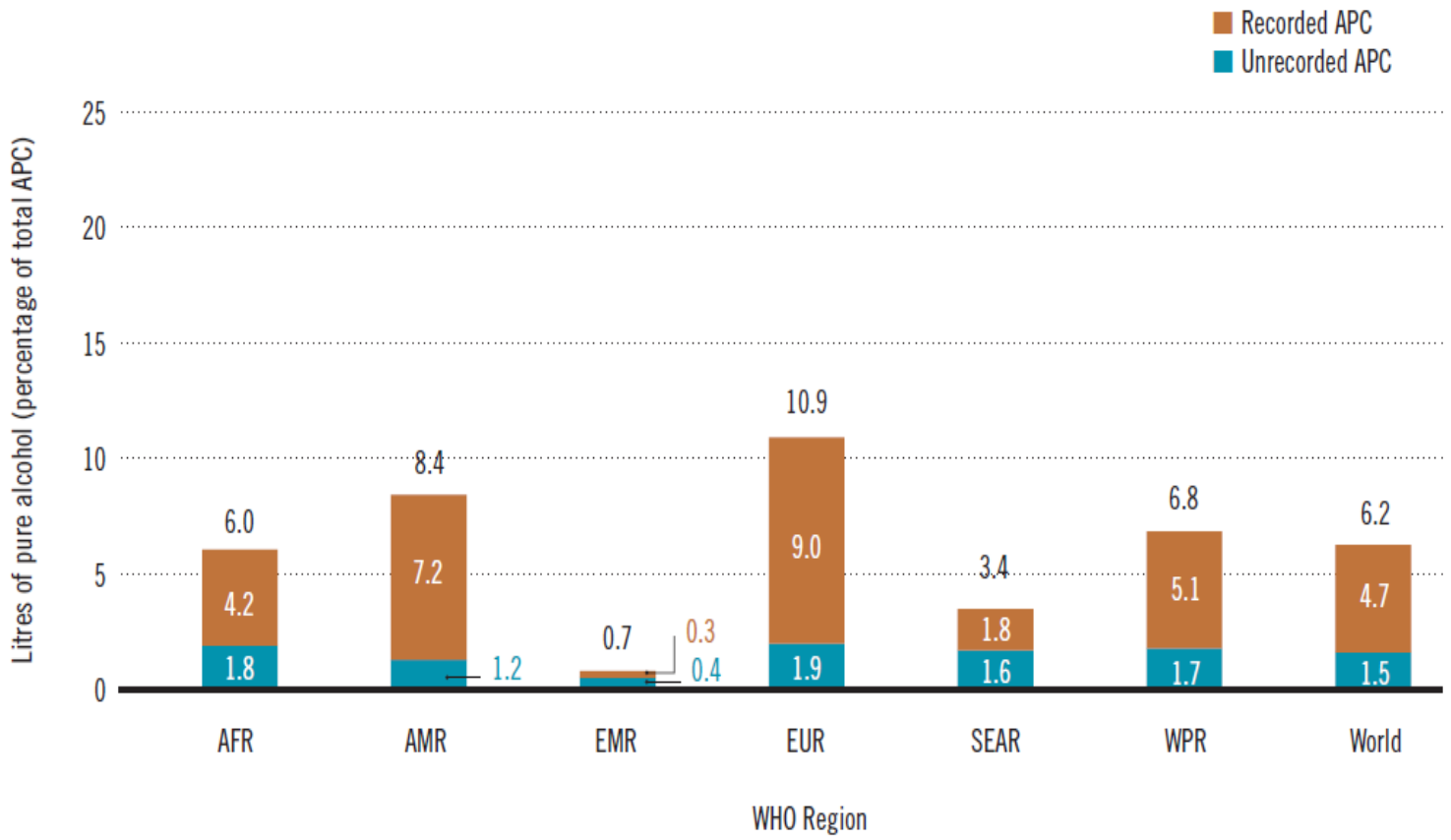
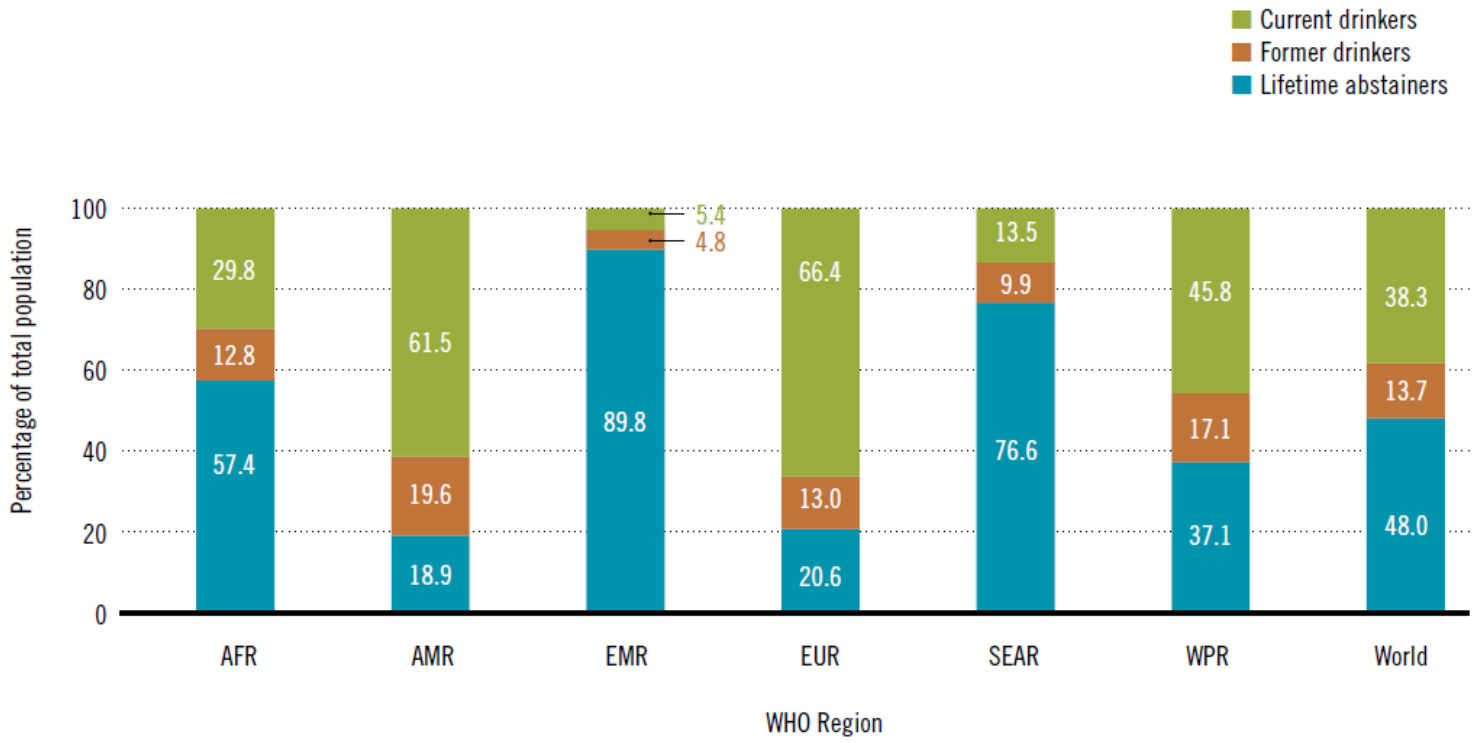


Figure 3. Total, unrecorded and recorded alcohol per capita (15+ years) consumption in litres of pure alcohol by WHO region and the world, 2010



Drinking patterns

Figure 5. Proportion (%) of current drinkers, former drinkers and lifetime abstainers among the total population (15+ years) by WHO region and the world, 2010



Beer and Health

Most Consumed Alcoholic Beverages

Figure 4. Proportion (%) of recorded alcohol per capita (15+ years) consumption consumed in the form of beer, wine, spirits and other types of beverages by WHO region and the world, 2010

Alcohol drinking and cardiometabolic risk

HEALTH EFFECTS OF BEER CONSUMPTION

Wine consumption and Cardiometabolic Risk

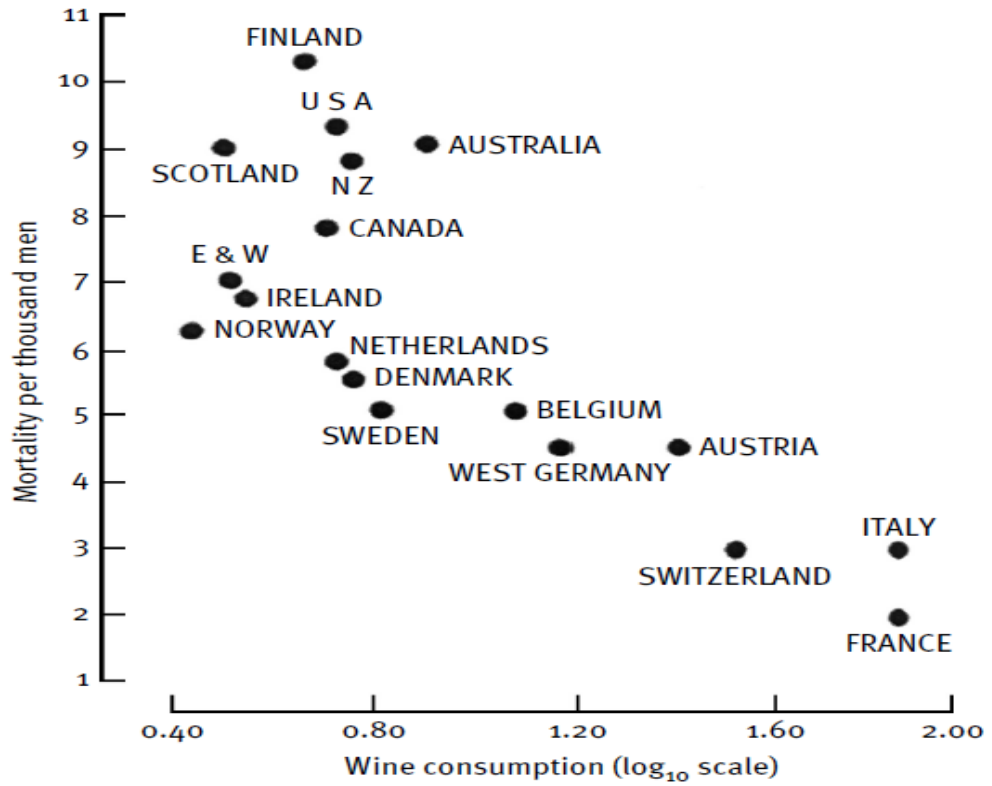


Figure 1: The French Paradox demonstrating lower mortality in France versus other countries in relation to wine consumption. Reprinted with permission from St. Leger et al.[2]

There is, strong evidence that alcohol may play a role in longevity.

The most likely explanation?

The reduced risk of cardiovascular disease …

The J-shaped effect of alcohol drinking

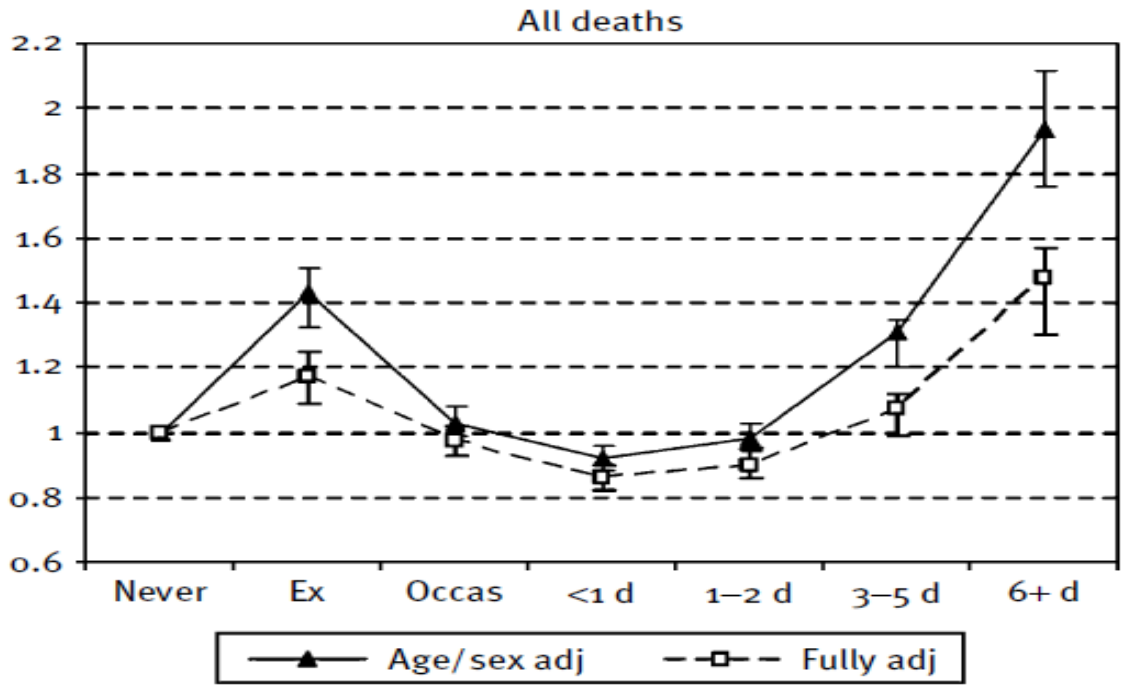


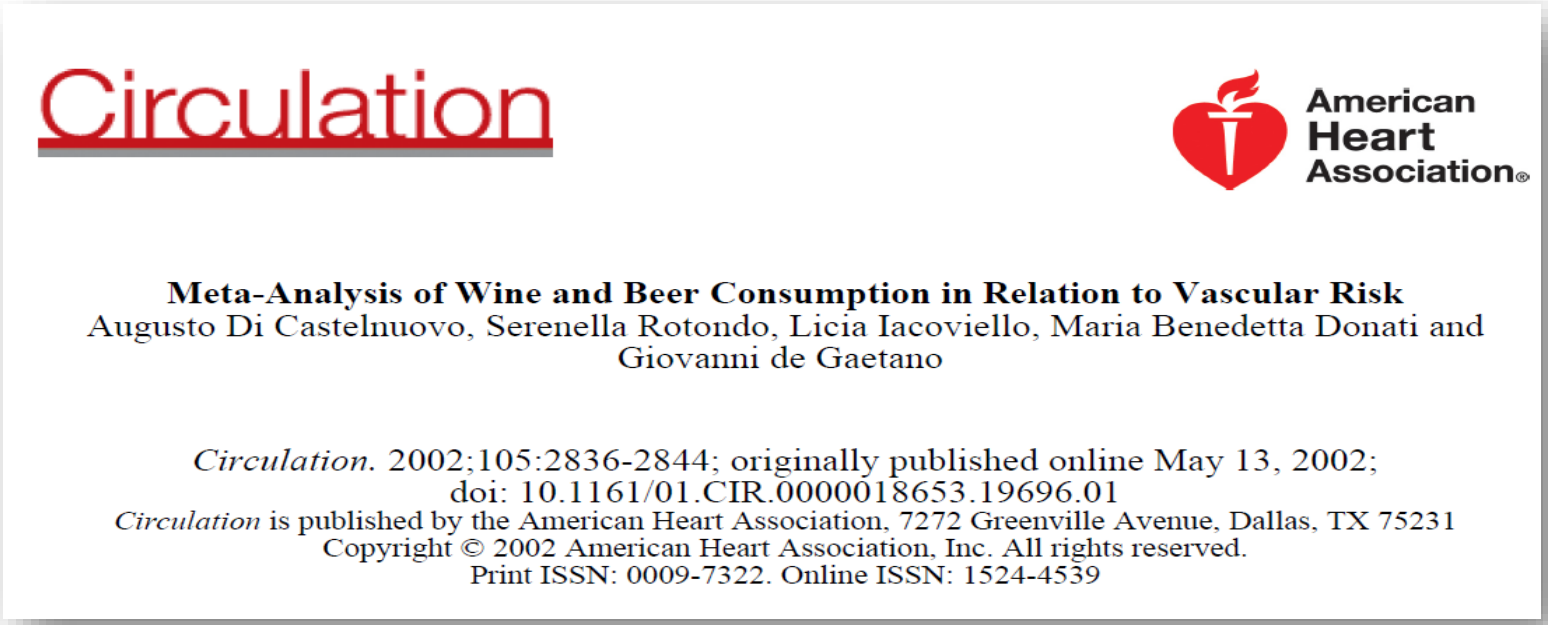
Figure 2: J-shaped mortality curve demonstrating decreased mortality with moderate drinking and higher mortality with heavier drinking. Relative risk scores are listed on the *y* axis, and alcohol consumption on the *x* axis. The two data sets are with age and sex adjustment versus full adjustment for multiple variables. Reprinted with permission from Klatsky and Udaltsova.[19]

Alcohol consumption and Cardiometabolic Risk

Wine or other beverages

- There is continuing controversy regarding the relative health effects of **the types of alcoholic beverages**:
  - spirits, beer and wine.
  - **Most,** but not all, studies **suggest that red wine uniquely reduces morbidity/mortality** compared with other alcoholic beverages.

- **However, what about beer consumption?**



Circulation

American Heart Association

Meta-Analysis of Wine and Beer Consumption in Relation to Vascular Risk

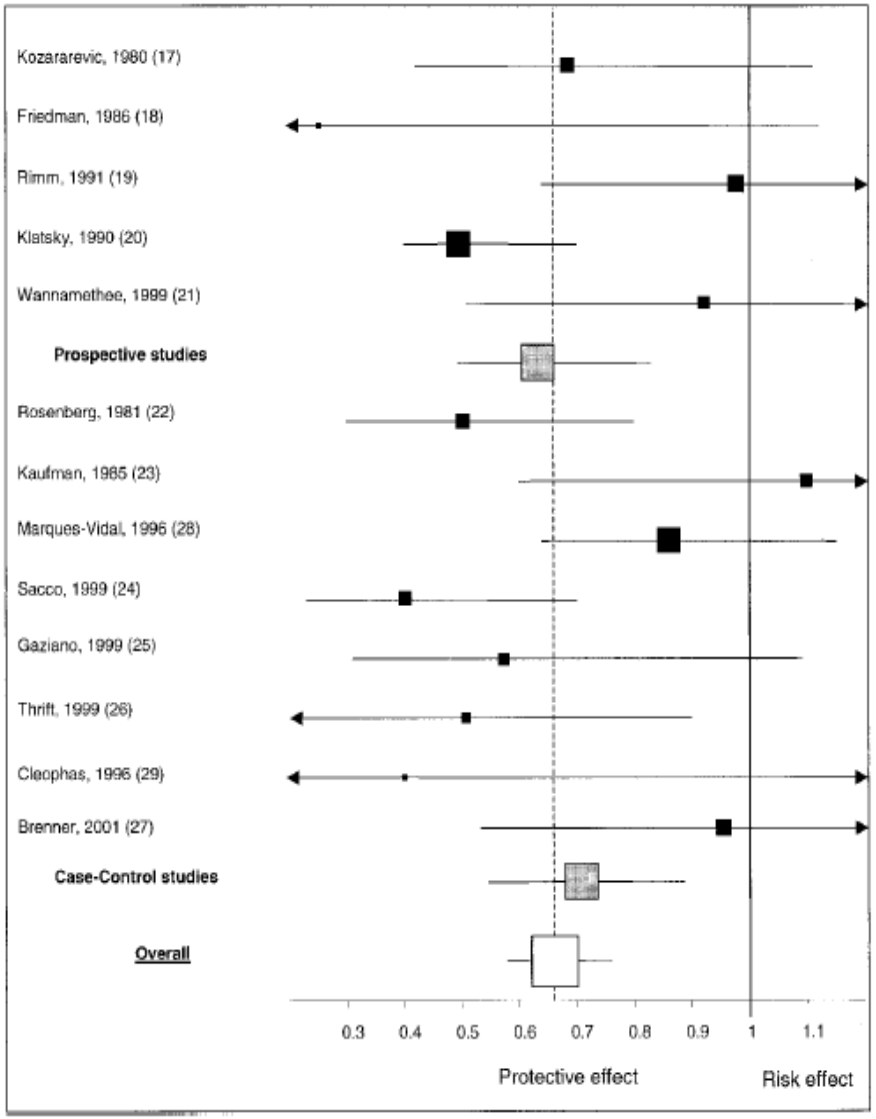
Augusto Di Castelnuovo, Serenella Rotondo, Licia Iacoviello, Maria Benedetta Donati and Giovanni de Gaetano

Circulation. 2002;105:2836-2844; originally published online May 13, 2002;
doi: 10.1161/01.CIR.0000018653.19696.01
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

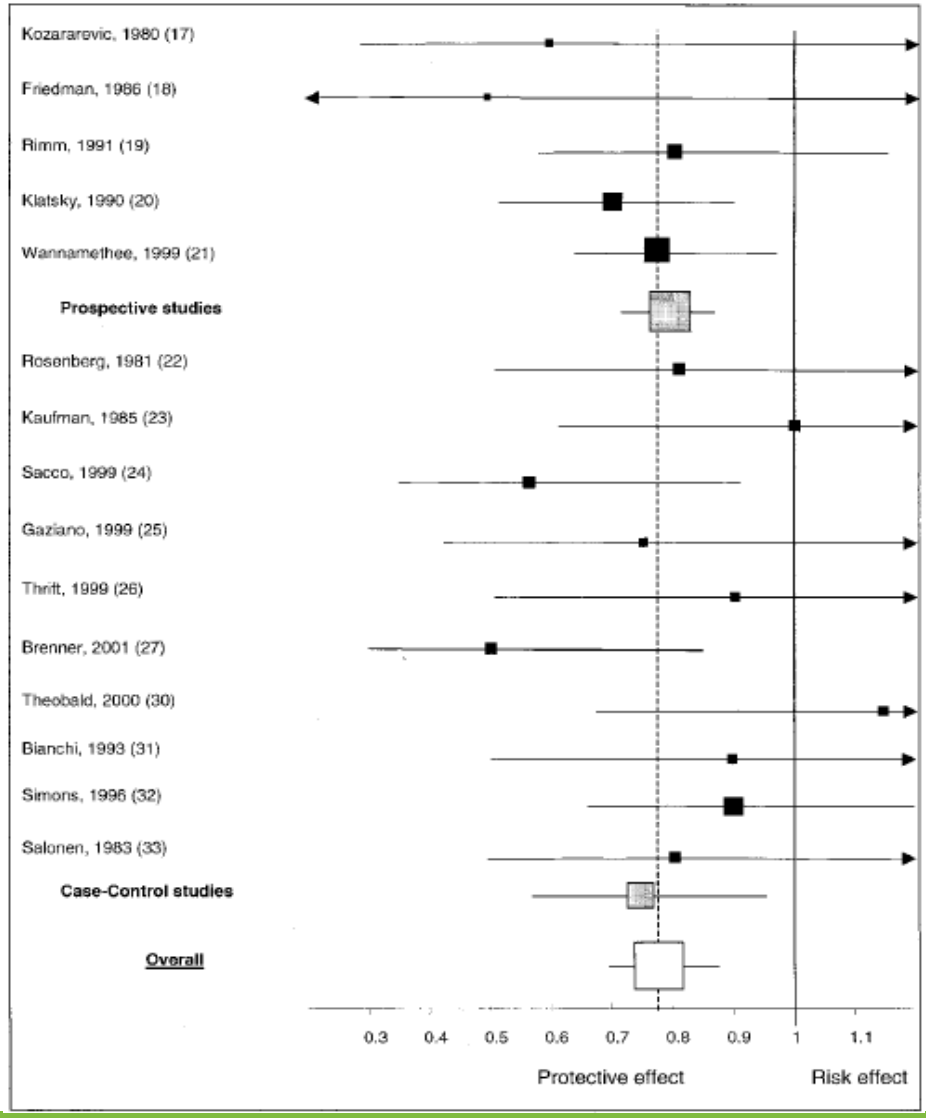
Print ISSN: 0009-7322. Online ISSN: 1524-4539

- *A meta-analysis of 26 studies on the relationship between wine or beer consumption and vascular risk was performed …*

Wine consumption, N=201.308



Beer consumption, N=208.096



Di Castelnuovo, Circulation, 2002

TABLE 2. Subgroup Analysis Using Studies Included in the Drinkers vs Nondrinkers Meta-Analyses

	Wine			Beer		
Subgroup	n	RR	99% CI	n	RR	99% CI
Overall	13	0.68	0.59–0.77*	15	0.78	0.70–0.86*
Type of cohort						
Prospective studies	5	0.64	0.50–0.83*	8	0.79	0.67–0.94*
Case-control studies	8	0.71	0.56–0.90*	7	0.74	0.57–0.96*
Type of event						
Coronary heart disease	11	0.71	0.59–0.85	13	0.79	0.68–0.91
Cerebrovascular disease	2	0.43	0.24–0.78	2	0.67	0.41–1.10
Nonfatal vascular events	8	0.71	0.56–0.90	7	0.74	0.57–0.96
Cardiovascular mortality	2	0.49	0.34–0.70	3	0.76	0.55–1.05
Sex effect						
Only men	6	0.87	0.68–1.12	6	0.82	0.68–0.99
Both sexes	7	0.53	0.42–0.68	9	0.72	0.58–0.90
Adjustment for different types of alcoholic beverages						
Not adjusted	3	0.53	0.39–0.73	4	0.79	0.62–1.01
Adjusted	10	0.75	0.61–0.93	11	0.77	0.65–0.92
Adjustment for indicators of social class						
Not adjusted	3	0.78	0.56–1.08	3	0.68	0.41–1.14
Adjusted	10	0.64	0.52–0.79	12	0.78	0.68–0.91
Other						
No light or occasional drinkers in the reference group	10	0.73	0.59–0.91	11	0.80	0.66–0.97
No ex-drinkers in the reference group	5	0.61	0.47–0.79	5	0.77	0.63–0.94
Same reference group for both wine and beer	9	0.62	0.50–0.77	9	0.72	0.59–0.88

*95% CI.

Di Castelnuovo, Circulation, 2002

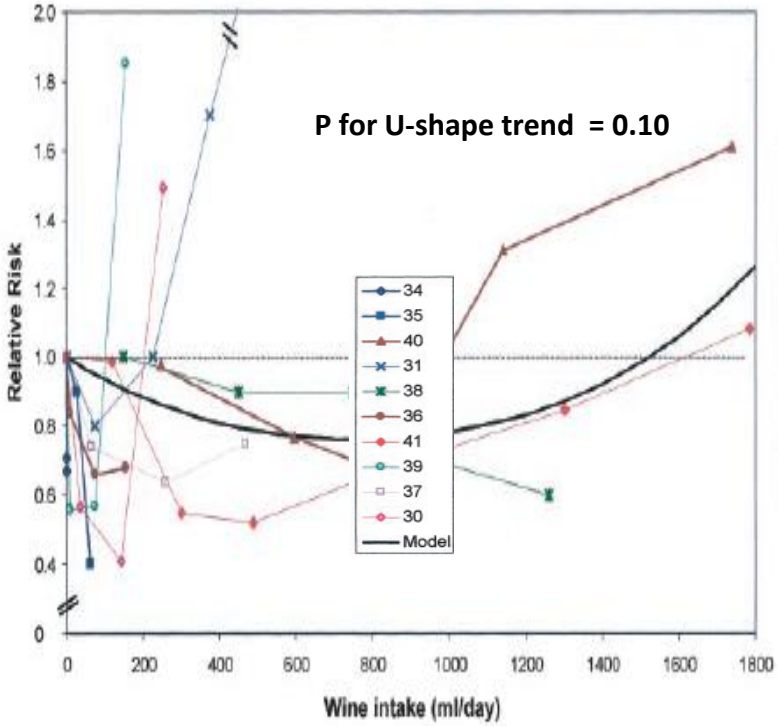


Figure 2. RRs or odds ratios for different categories of wine intake (dose-response curves), as reported by the original investigators. The black line indicates the predicted model using data from all studies. Considering all the studies, the best-fitting model was a quadratic model (R^2=0.42 versus R^2=0.32 for the linear model with a positive linear term; P=0.76); it included a negative linear term ($\beta_1 = -7.1 \pm 4.1 \times 10^{-4}$; P=0.10) and a quadratic term ($\beta_2 = 0.0047 \pm 0.0024 \times 10^{-4}$; P=0.061).

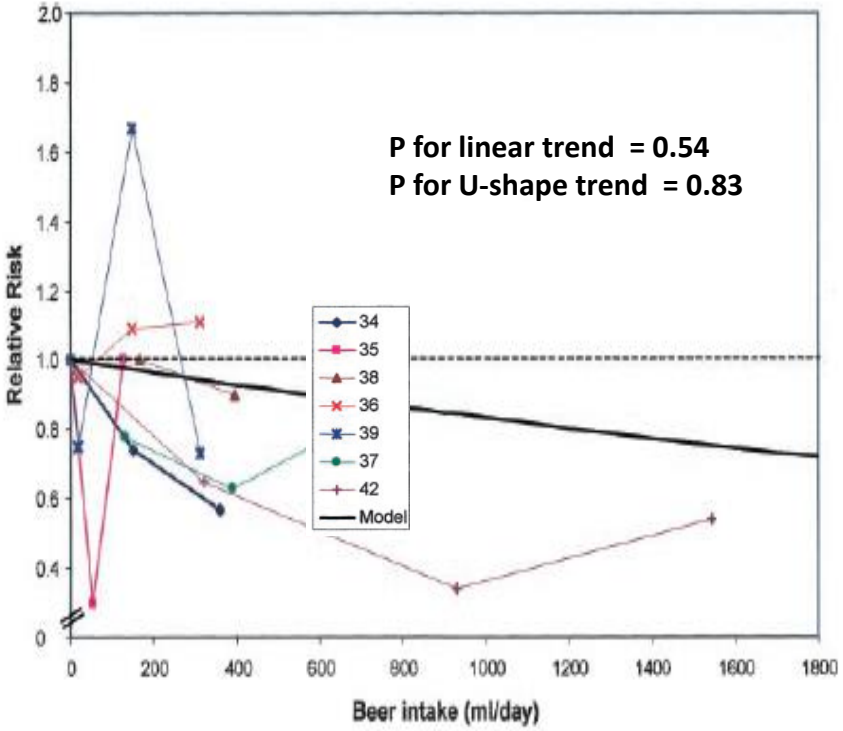


Figure 5. RRs or odds ratios for different categories of beer intake (dose-response curves). The black line indicates the predicted model using data from all studies. Considering all the studies, the best-fitting model was not statistically significant (R^2=0.64) including a negative linear term ($\beta_1 = -1.8 \pm 2.9 \times 10^{-4}$; P=0.54); the inclusion of a quadratic term did not improve the fit. In prospective studies $\beta_1 = -1.0 \pm 4.3 \times 10^{-4}$ (P=0.83).

Di Castelnuovo, Circulation, 2002

J Epidemiol Community Health 2009;**63**:534–540. doi:10.1136/jech.2008.082198

Research report

EDITOR'S CHOICE

Long-term wine consumption is related to cardiovascular mortality and life expectancy independently of moderate alcohol intake: the Zutphen Study

M T Streppel,[1,2] M C Ocké,[1] H C Boshuizen,[1] F J Kok,[2] D Kromhout[2]

Methods: The impact of long-term alcohol intake and types of alcoholic beverages consumed on cardiovascular mortality and life expectancy at age 50 was investigated in the Zutphen Study, a cohort of 1373 men born between 1900 and 1920 and examined repeatedly between 1960 and 2000. Hazard ratios (HRs) for total alcohol intake and alcohol from wine, beer and spirits were obtained from time-dependent Cox regression models. Life expectancy at age 50 was calculated from areas under survival curves.

Table 3 Long-term consumption of alcohol from beer, wine or spirits in relation to cardiovascular and all-cause mortality within the Zutphen Study

			Long-term intake (cumulative average, time-dependent)		
	Alcohol source	Amount (g/day)	Crude HR (95% CI)*	Adjusted HR (95% CI)†§	Adjusted HR (95% CI)‡§
Coronary heart disease	Wine	>0 to 20	0.59 (0.42 to 0.83)	0.60 (0.41 to 0.87)	0.61 (0.41 to 0.89)
		>20	NI¶	NI	NI
	Beer	>0 to 20	0.86 (0.68 to 1.09)	0.79 (0.62 to 1.02)	0.82 (0.60 to 1.12)
		>20	1.13 (0.41 to 3.08)	1.02 (0.35 to 2.93)	1.10 (0.36 to 3.39)
	Spirits	>0 to 20	0.93 (0.70 to 1.23)	0.85 (0.63 to 1.15)	0.92 (0.63 to 1.34)
		>20	0.86 (0.40 to 1.84)	0.89 (0.42 to 1.86)	1.01 (0.35 to 2.97)
Cerebrovascular	Wine	>0 to 20	0.67 (0.44 to 1.01)	0.82 (0.53 to 1.26)	0.92 (0.58 to 1.46)
		>20	NI	NI	NI
	Beer	>0 to 20	0.64 (0.45 to 0.93)	0.62 (0.42 to 0.92)	0.81 (0.48 to 1.35)
		>20	0.68 (0.09 to 5.01)	0.78 (0.10 to 6.26)	0.78 (0.09 to 6.73)
	Spirits	>0 to 20	0.76 (0.51 to 1.13)	0.79 (0.52 to 1.20)	1.44 (0.72 to 2.86)
		>20	0.62 (0.19 to 1.97)	0.70 (0.21 to 2.34)	0.93 (0.20 to 4.32)
Total cardiovascular	Wine	>0 to 20	0.63 (0.51 to 0.78)	0.66 (0.52 to 0.84)	0.68 (0.53 to 0.86)
		>20	1.37 (0.19 to 9.78)	2.45 (0.33 to 18.1)	2.20 (0.30 to 16.4)
	Beer	>0 to 20	0.84 (0.70 to 1.00)	0.82 (0.69 to 0.99)	0.91 (0.72 to 1.14)
		>20	1.30 (0.62 to 2.74)	1.29 (0.58 to 2.84)	1.26 (0.55 to 2.88)
	Spirits	>0 to 20	0.85 (0.69 to 1.04)	0.82 (0.66 to 1.03)	0.93 (0.70 to 1.24)
		>20	0.84 (0.50 to 1.41)	0.91 (0.54 to 1.55)	0.88 (0.47 to 1.64)
All-cause	Wine	>0 to 20	0.68 (0.58 to 0.78)	0.72 (0.61 to 0.85)	0.73 (0.62 to 0.87)
		>20	0.79 (0.11 to 5.59)	1.28 (0.18 to 9.28)	1.21 (0.17 to 8.82)
	Beer	>0 to 20	0.91 (0.80 to 1.05)	0.89 (0.78 to 1.02)	0.98 (0.83 to 1.17)
		>20	1.41 (0.84 to 2.36)	1.29 (0.76 to 2.19)	1.37 (0.74 to 2.53)
	Spirits	>0 to 20	0.86 (0.75 to 1.00)	0.87 (0.74 to 1.01)	0.97 (0.80 to 1.18)
		>20	1.08 (0.76 to 1.53)	1.02 (0.67 to 1.55)	1.09 (0.69 to 1.73)

*Crude HR, hazard ratio; CI, confidence interval.

†Hazard ratios are adjusted for former drinking, energy intake without alcohol, the number of cigarettes smoked, cigarette smoking duration, cigar or pipe smoking, intake of vegetables, fruit, fish, saturated and *trans* fatty acids, body mass index, prevalence of myocardial infarction, stroke, diabetes mellitus and cancer, and baseline socioeconomic status.

‡Hazard ratios are adjusted for former drinking, energy intake without alcohol, the number of cigarettes smoked, cigarette smoking duration, cigar or pipe smoking, intake of vegetables, fruit, fish, saturated and *trans* fatty acids, body mass index, prevalence of myocardial infarction, stroke, diabetes mellitus and cancer, baseline socioeconomic status and total alcohol intake.

§Because of missing data in the covariates, the number of events may be smaller than the number mentioned in table 1.

¶NI, because of the small number of men with >20 g of long-term alcohol intake from wine, the calculated hazard ratios are not informative.

Streppel MT, J Epidemiol Community Health, 2009

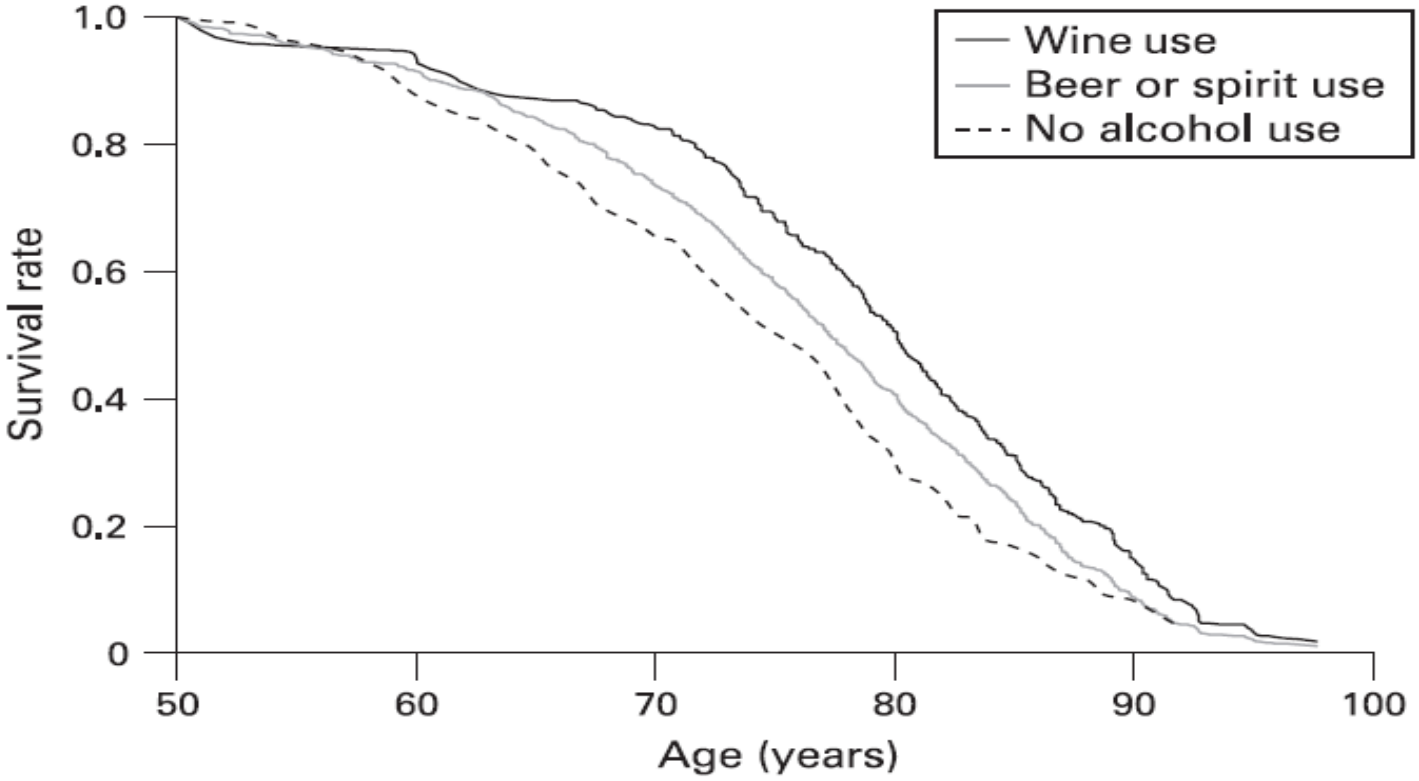


Figure 2 Survival curves for men with long-term consumption of alcohol from wine, beer or spirits, and no alcohol consumers within the Zutphen Study, adjusted for baseline energy intake without energy from alcohol, the number of cigarettes smoked, cigar or pipe smoking, intake of vegetables, fruit, fish, saturated and *trans* fatty acids, body mass index, prevalence of myocardial infarction, stroke, cancer and diabetes mellitus, and socioeconomic status.

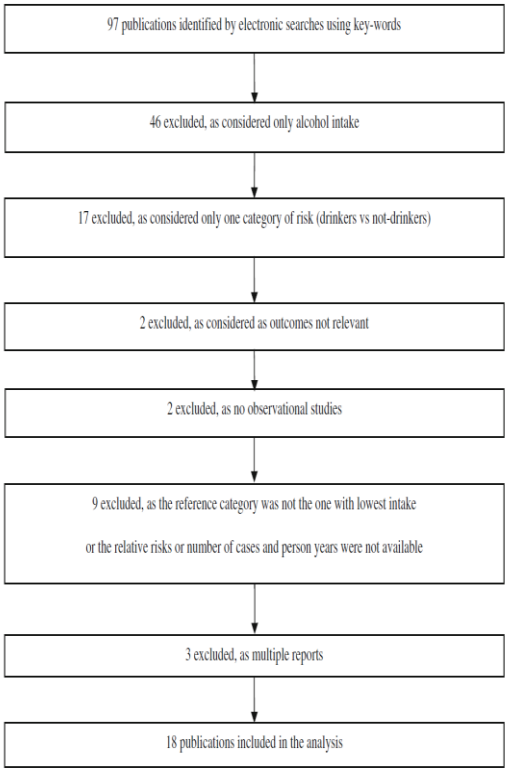
Streppel MT, J Epidemiol Community Health, 2009

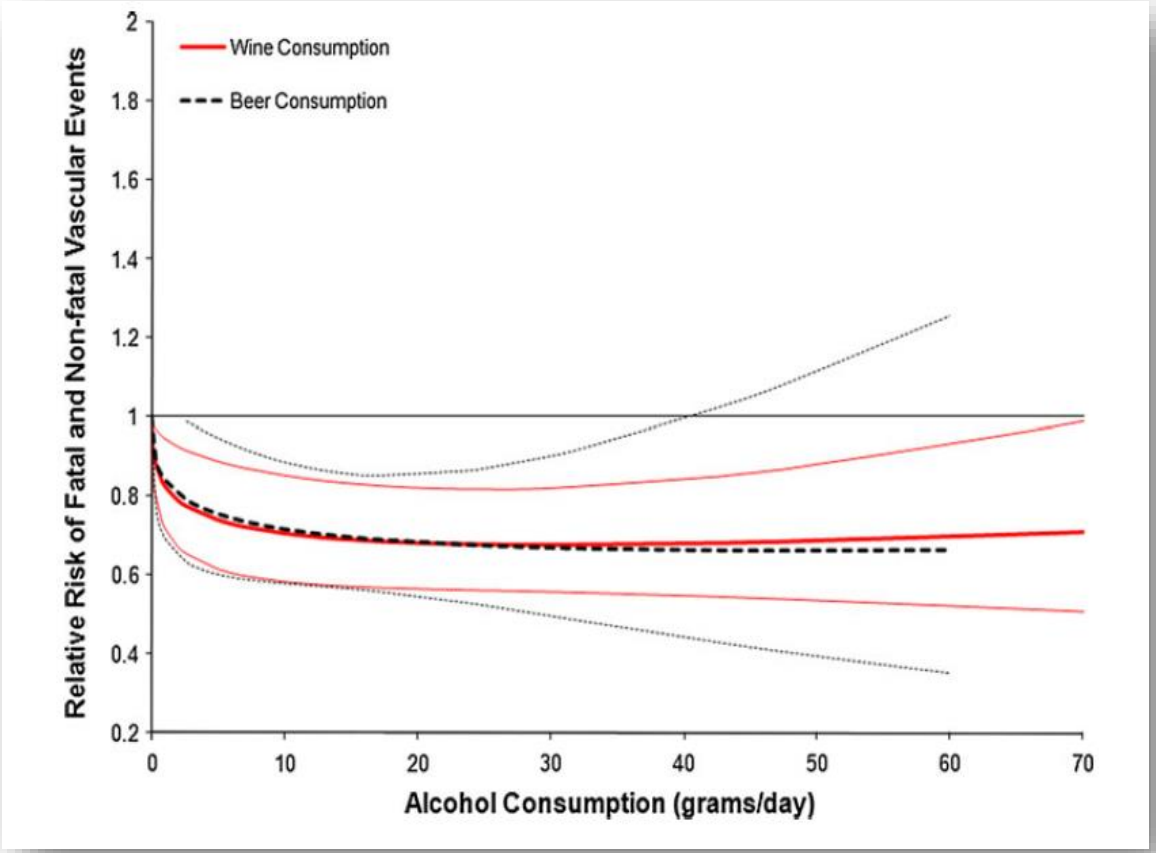
Eur J Epidemiol (2011) 26:833–850
DOI 10.1007/s10654-011-9631-0

REVIEW

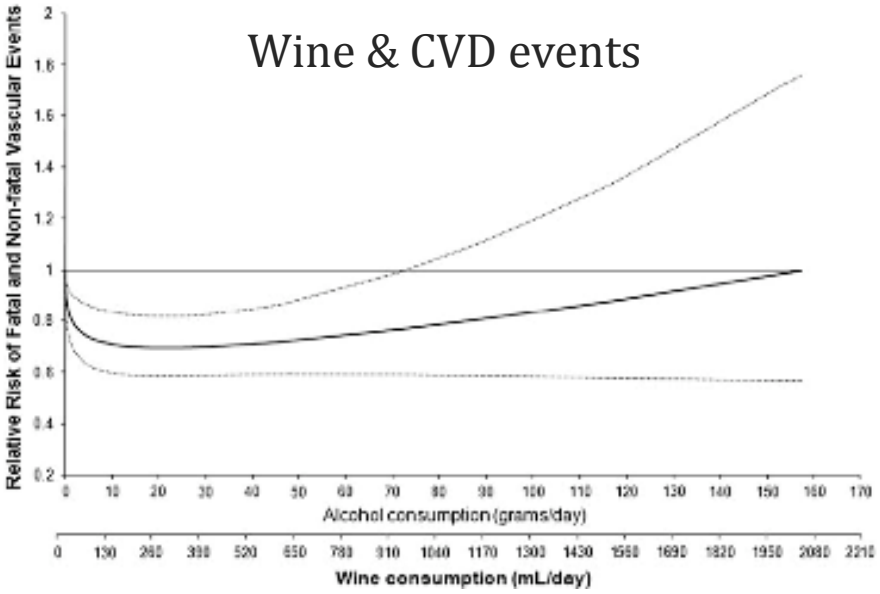
Wine, beer or spirit drinking in relation to fatal and non-fatal cardiovascular events: a meta-analysis

Simona Costanzo · Augusto Di Castelnuovo · Maria Benedetta Donati · Licia Iacoviello · Giovanni de Gaetano

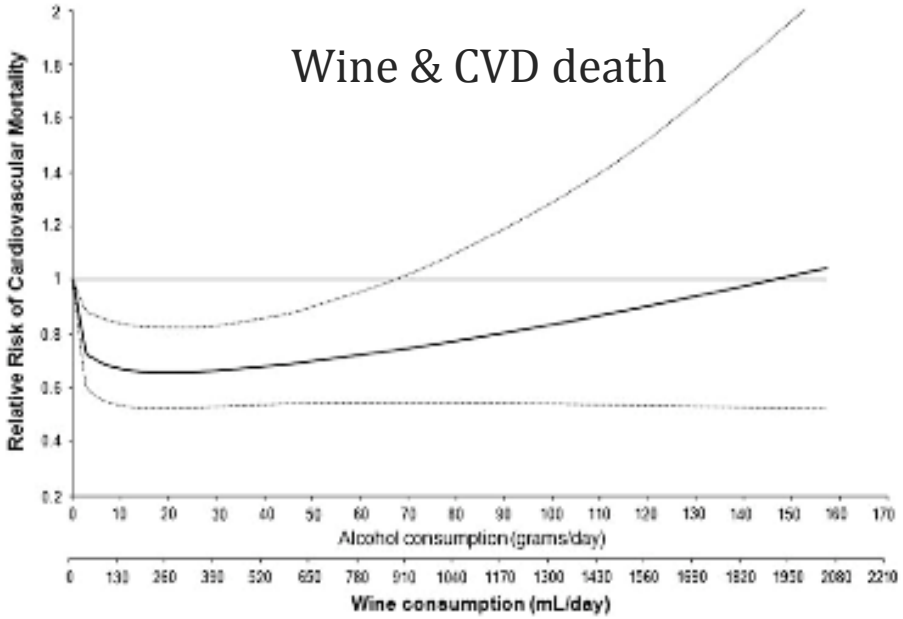




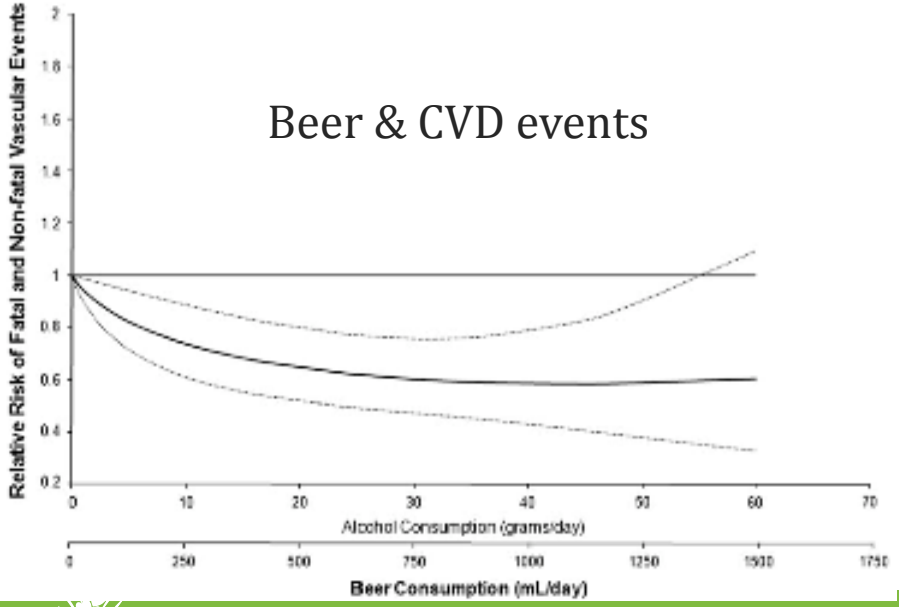
Wine & CVD events



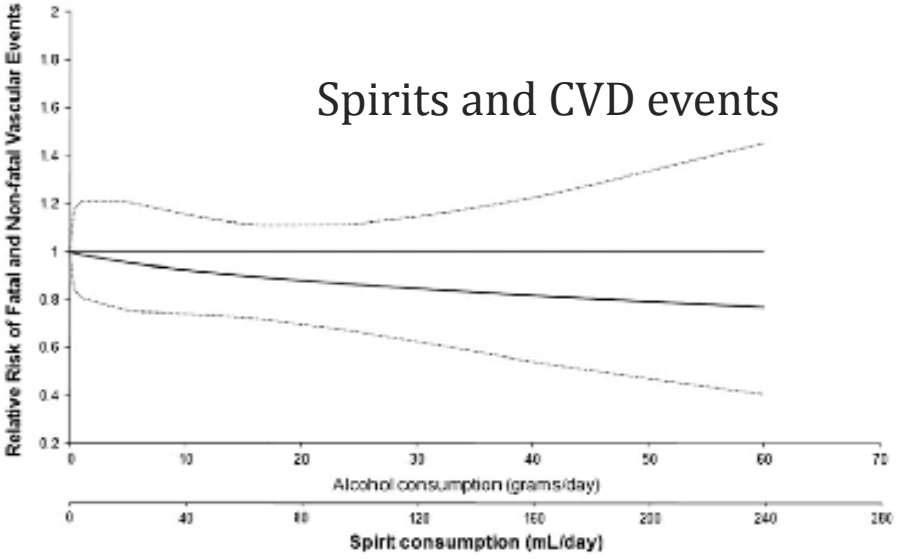
Wine & CVD death



Beer & CVD events



Spirits and CVD events



Costanzo C et al., Eur J Epid 2011

Wine, Beer or other spirits?

- *The meta-analysis by Costanzo et al., confirms the **J-shaped association** between wine consumption and vascular risk and provides,*
  - *for the first time,*

- *evidence for a similar relationship between **beer and vascular risk.***

Costanzo C et al., Eur J Epid 2011

Table 1 Participant's demographic and lifestyle characteristics

	Alcohol consumption				P
	None	*50–200 ml/day*	*200–350 ml/day*	*> 350 ml/day*	
Men (n = 234)					
% of participants	56	27	13	4	—
Age (years)	76±7	78±8	76±7	76±6	0.06
Years of school	6.0±2*	6.5±2	6.0±3	5.4±2**	<0.001
Current smokers (%)	20	25	95*	67**	<0.001
Physically inactive (%)	48	56	60	60	0.48
Systolic blood pressure (mm Hg)	133±17*	131±16	136±16*	149±11**	0.003
Diastolic blood pressure (mm Hg)	76±9	75±9	77±9	88±9	0.009
Hypertension (%)	64*	57	65*	70*	0.02
Diabetes mellitus (type II) (%)	20	16	10	10	0.14
Hypercholesterolemia (%)	45	28	33	35	0.07
Obesity (%)	35	28	30	33	0.25
Women (n = 308)					
% of participants	81	9	6	4	
Age (years)	73±12	75±6	75±7	74±6	0.09
Years of school	5.0±2	5.9±3*	6.0±3*	5.3±2	0.01
Current smokers (%)	4	6	9*	11**	<0.001
Physically inactive (%)	65	68	72	69	0.68
Systolic blood pressure (mm Hg)	136±15	135±16	139±16*	149±11*	0.03
Diastolic blood pressure (mm Hg)	78±9	75±10	79±9	83±9*	0.04
Hypertension (%)	60*	55	61*	72*	0.01
Diabetes mellitus (type II) (%)	15	14	17	23	0.07
Hypercholesterolemia (%)	53	57	55	54	0.06
Obesity (%)	40	56	55	67*	0.05

*$P<0.05$ and **$P<0.01$ for the differences between various alcohol consumption groups vs moderate consumption.

Journal of Human Hypertension (2007) 0, 1–3

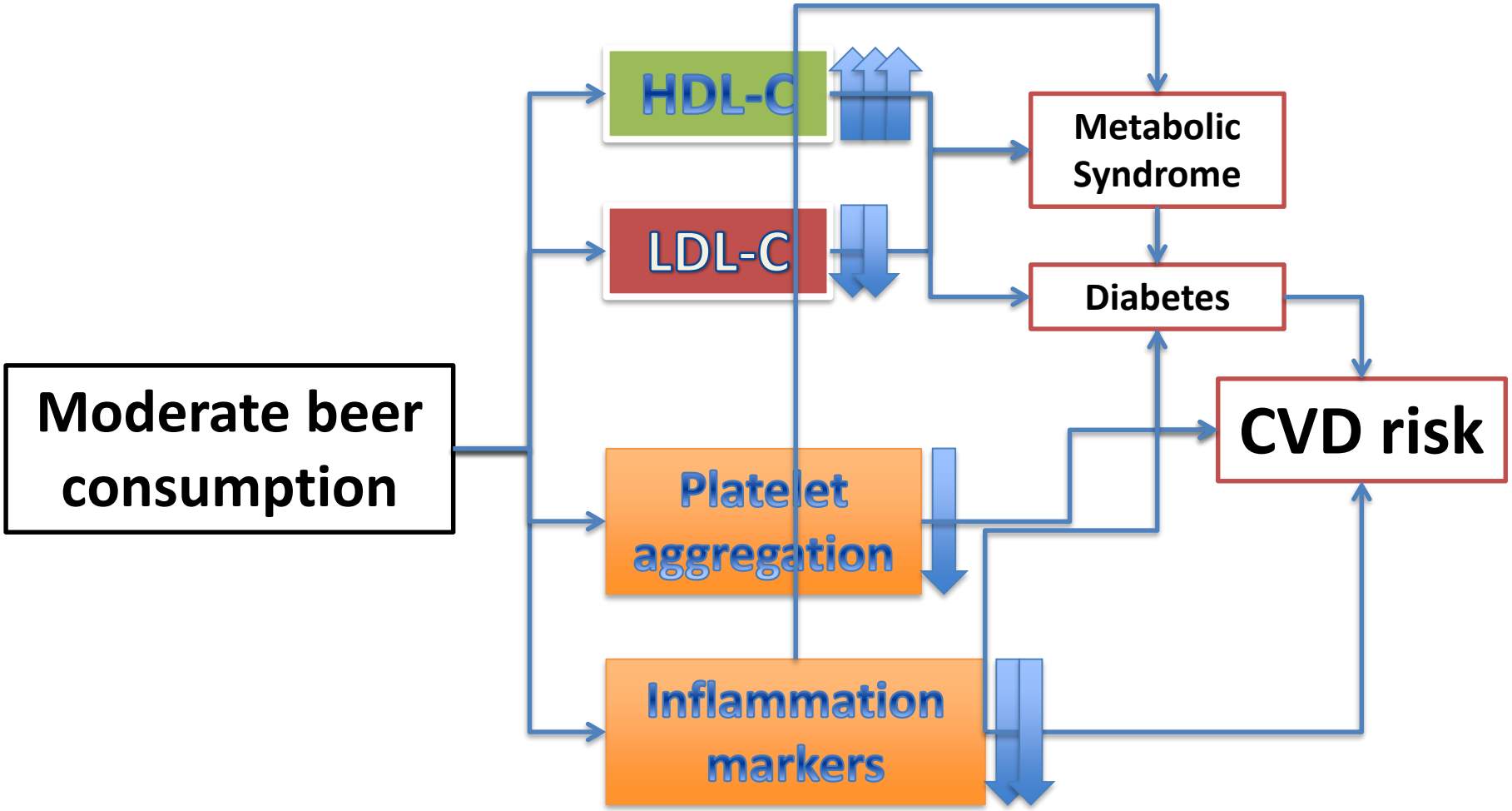
www.nature.com/jhh

RESEARCH LETTER

The J-shape association of alcohol consumption on blood pressure levels, in elderly people from Mediterranean Islands (MEDIS epidemiological study)

MEDIS Study

30+ Med Islands
6 countries
2800+ older adults participants
10+ yrs of adventure



Evidence – based mechanisms by which moderate bee consumption affect CVD risk ..

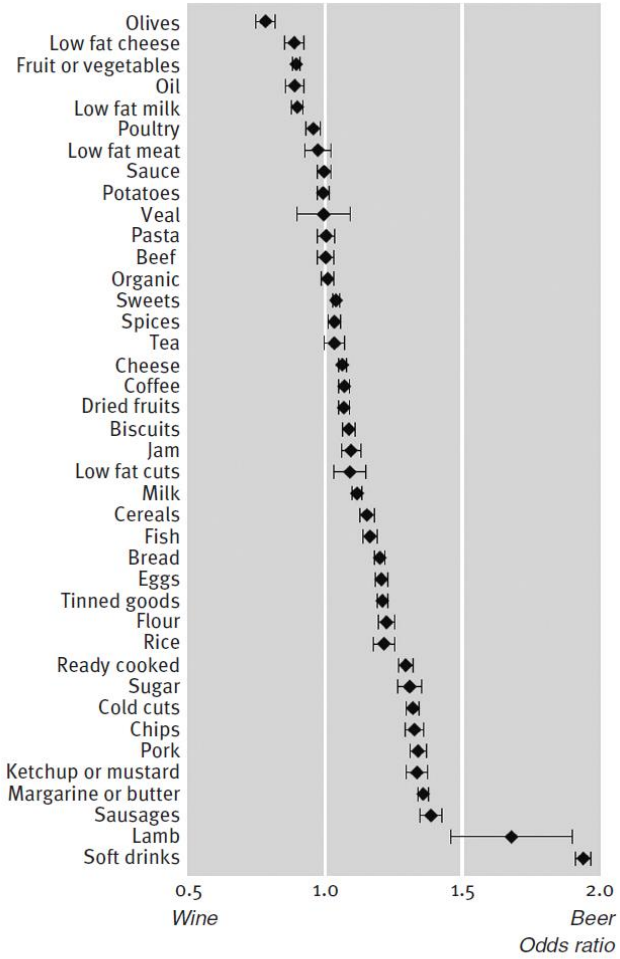


Figure 3: This figure demonstrates that purchase of healthier food items was related to purchase of wine over beer. Odds ratios <1 were items purchased more commonly with wine. Odds ratios >1 indicate items purchased more commonly with beer. Reprinted with permission from Johansen D et al.[25]

Wine vs. Beer…
A case of confounding?

…, an innovative study of 3.5 mill supermarket transactions in Denmark revealed that those who purchased **wine also made healthier food choices, such as olives, fruits, and vegetables ... Individuals who purchased beer bought more pre-cooked food, sugar, cold cuts, chips, pork, butter, and sausage.**

Johansen D, et al., *BMJ* 2006

Another large study of almost 13,000 subjects in this country confirmed that **wine drinkers not only had more favorable dietary habits, but also exercised more and had higher levels of formal education than regular consumers** of other alcoholic beverages

Paschall M, Lipton RI: *Drug Alcohol Depend 2005*

The benefits from moderate beer consumption may have been underestimated …

Fermented beverages and its effect on cardiometabolic risk

- Current results provide consistent evidences for a **J-shaped** inverse association (i.e., moderate intake → benefits)
  - between **beer** consumption and CVD risk.
- No protection has been reported instead, in association with the consumption of any spirit amount.
  - The hazards of excess or binge alcohol drinking should be always highlighted and heavy or binge drinkers pushed to cut their consumption to a regular, low-moderate level.

THANK YOU!

On the basis of the available data, it would seem reasonable to recommend that individuals who currently drink **try to move towards moderate consumption** … **it seems that beer than other spirits is more beneficial.**

Importantly, **there is currently insufficient evidence to recommend that abstainers initiate drinking for health benefits**, or for light drinkers to increase their alcohol consumption.