

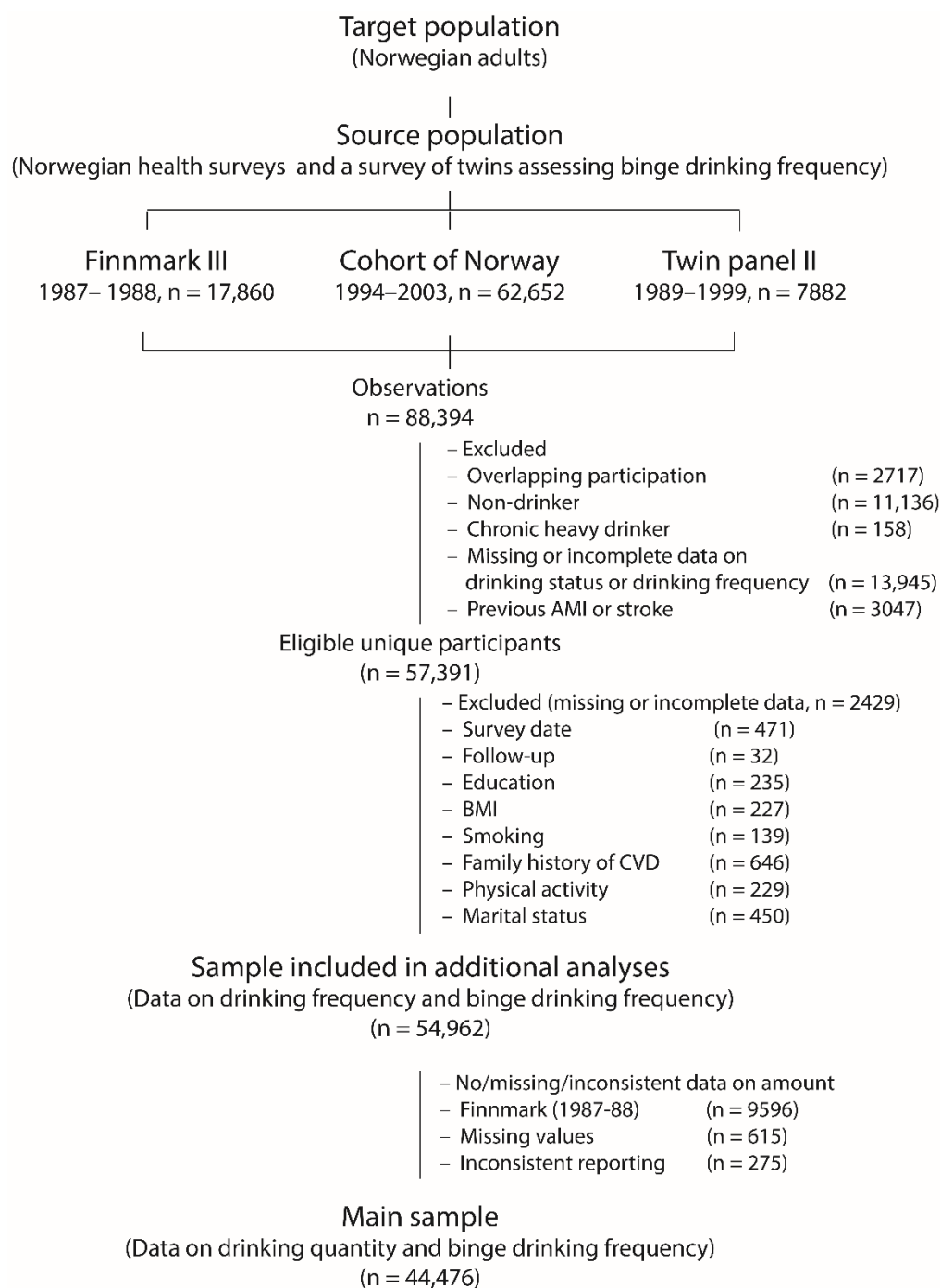
Binge drinking and risk of ischemic heart disease and stroke: a study of pooled Norwegian health surveys

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Web Figure 1.



Web Figure 1. For the subgroup with data from more than one survey, we selected a single survey. Priority was a trade-off between the quality of alcohol data and the length of follow-up (Finnmark III > Cohort of Norway > Twin panel II). The excluded visits/observations are listed under “overlapping participation”.

Web Table 1. Characteristics and alcohol questions applied in the surveys that constituted the source population for this study.

	Survey year (range)	Participants (n)	Response rate (%)	Age (mean ± SD)	Age (range)	Sex (male)	Average drinking frequency	Average drinking quantity	Binge drinking frequency
The Counties Studies									
Finnmark III	1987-1988	17,860	<u>77.5</u>	47.2 ± 9.3	(19 – 82)	50.6	A	NA	E
Cohort of Norway (CONOR)									
HUBRO	1996-2001	21,267	<u>37.5</u>	48.4 ± 15.5	(29.9 – 77.7)	44.5	B	C	F
I-HUBRO	2002	3526	<u>29.9</u>	38.8 ± 9.2	(19.2 – 60.9)	52.0	B	C	F
OSLO 2	1996-2001	6890	<u>48.7</u>	68.9 ± 6.2	(47.4 – 78.1)	100	B	C	F
OPPHED	2000-2001	12,210	<u>55.5</u>	50.1 ± 14.3	(29.9 – 76.8)	45.7	B	C	F
TROMSØ 5	2001	7833	<u>78.0</u>	59.8 ± 14.1	(29.5 – 88.9)	43.6	B	C	F
MoRo II	2003	1956	<u>35.9</u>	51.3 ± 9.7	(33.3 – 70.2)	44.4	B	C	F
REST-Troms	2002	2479	<u>57.5</u>	49.0 ± 13.8	(29.0 – 81.3)	43.6	B	C	F
REST-FINN	2002	6491	<u>57.5</u>	59.4 ± 11.0	(29.3 – 77.7)	47.6	B	C	F
The Twin registry									
Second panel	1989-1999	7882	<u>83.7</u>	49.4 ± 11.1	(30.0 – 79.0)	45.6	B	D	E*

Questions used to assess alcohol intake:

- A) “How many glasses of beer, wine, or spirits do you usually drink during a two-week period?”
 - B) “How often during the past 12 months have you consumed alcohol?”
 - C) “How often during the past 12 months have you consumed alcohol” in combination with “When you drank alcohol, how many glasses did you usually drink?”
 - D) “How many glasses of beer, wine, or spirits do you usually drink during a week?”
 - E) “How often during the past year did you drink at least the equivalent of 5 small bottles of beer, a full bottle of wine (or ½ bottle of strong wine*) or a ¼ bottle of liquor?”
 - F) Approximately how often during the past 12 months have you consumed alcohol corresponding to at least 5 glasses and/or spirits in 24 hours?
- NA = not assessed

For more information about the surveys, please consult the following references for information: Cohort of Norway (1); Finnmark III (2); and the Twin registry second panel (3).

Web Table 2. The number of events and hazard ratios with 95% confidence intervals for incident ischemic heart disease and stroke according to binge drinking frequency in different age groups among 44,476 Norwegian adult men and women who participated in a cardiovascular health examination survey in midlife (1987 – 2003) and reported to be currently drinking alcohol.

Binge drinking frequency	Average drinking quantity 2 – <60 grams/day	
	Age <50 years (n = 17,118)	Age ≥50 years (n = 11,026)
Ischemic heart disease		
<u>Event/no event (n)</u>		
All	156/16,962	673/10,353
Never/infrequent	92/9921	541/8189
Frequent	64/7041	132/2164
<u>HR (95% CI)</u>		
Never/infrequent	1.00	
Frequent ¹	0.95 (0.69, 1.32)	0.97 (0.80, 1.18)
Frequent ²	0.71 (0.51, 1.00)	0.94 (0.77, 1.14)
Frequent ³	0.70 (0.49, 1.00)	0.97 (0.78, 1.20)
Stroke		
<u>Event/no event (n)</u>		
All	93/17,025	694/10,332
Never/infrequent	52/9961	560/8170
Frequent	41/7064	134/2162
<u>HR (95% CI)</u>		
Never/infrequent	1.00	
Frequent ¹	1.40 (0.91, 2.14)	1.09 (0.90, 1.32)
Frequent ²	1.26 (0.81, 1.94)	1.04 (0.85, 1.26)
Frequent ³	1.21 (0.76, 1.93)	0.94 (0.76, 1.17)

Binge drinking frequency was dichotomised into frequent (heavy episodic drinking; +60 grams of alcohol per occasion at least once per month) and never/infrequent (+60 grams of alcohol per occasion less frequent than once per month). Hazard ratios (HRs) and 95% confidence intervals (CIs) derived from Cox models adjusted for ¹) age and sex; ²) plus education, marital status, smoking, physical activity, body mass index and familial history of coronary heart disease; ³) plus average drinking quantity.

Web Table 3. The number of events and hazard ratios with 95% confidence intervals for incident ischemic heart disease and stroke according to binge drinking frequency in strata of men and women who participated in a cardiovascular health examination survey in midlife (1987 – 2003) and reported drinking alcohol in the range of 2 – <60 g/day.

Binge drinking frequency	Average drinking quantity 2 – <60 grams/day	
	Women (n = 11,677)	Men (n = 16,467)
Ischemic heart disease		
<u>Event/no event (n)</u>		
All	128/11,549	701/15,766
Never/infrequent	111/8835	522/9275
Frequent	17/2714	179/6491
<u>HR (95% CI)</u>		
Never/infrequent	1.00	1.00
Frequent ¹	1.16 (0.68, 1.97)	0.94 (0.79, 1.12)
Frequent ²	0.97 (0.56, 1.67)	0.88 (0.73, 1.05)
Frequent ³	0.94 (0.53, 1.67)	0.90 (0.74, 1.09)
Stroke		
<u>Event/no event (n)</u>		
All	192/11,485	595/15,872
Never/infrequent	161/8785	451/9346
Frequent	31/2700	144/6526
<u>HR (95% CI)</u>		
Never/infrequent	1.00	1.00
Frequent ¹	1.56 (1.04, 2.33)	1.06 (0.87, 1.28)
Frequent ²	1.41 (0.93, 2.12)	1.02 (0.83, 1.24)
Frequent ³	1.27 (0.82, 1.96)	0.93 (0.75, 1.16)

Binge drinking frequency was dichotomised into frequent (heavy episodic drinking; +60 grams of alcohol per occasion at least once per month) and never/infrequent (+60 grams of alcohol per occasion less frequent than once per month). Hazard ratios (HRs) and 95% confidence intervals (CIs) derived from Cox models adjusted for ¹) age; ²) plus education, marital status, smoking, physical activity, body mass index and familial history of coronary heart disease; ³) plus average drinking quantity.

Web Table 4. The number of events and hazard ratios with 95% confidence intervals for incident ischemic heart disease and stroke according to average drinking quantity among 43,039 participants in the Cohort of Norway. Lifetime non-drinkers were included in the reference category together with low intake drinkers (<2 g/day). Current abstainers and chronic heavy drinkers were included in the models.

<i>Binge drinking frequency</i>	<i>Average drinking quantity (grams/day)</i>				
	<i><2 and lifetime non-drinkers</i>	<i>2 – <12</i>	<i>12 – <24</i>	<i>24 – <60</i>	<i>2 – <60</i>
Ischemic heart disease					
<u>Event/no event (n)</u>					
All	620/13,996	550/20,032	117/3777	33/905	700/24,714
Never/infrequent	-	475/14,816	62/1344	13/165	550/16,325
Frequent	-	75/5216	55/2433	20/740	150/8389
<u>Hazard ratio (95% CI) according to average drinking quantity</u>					
All ¹	1.00	0.70 (0.63, 0.79)	0.66 (0.54, 0.81)	0.73 (0.51, 1.04)	0.70 (0.62, 0.78)
All ²	1.00	0.73 (0.65, 0.82)	0.70 (0.57, 0.86)	0.68 (0.48, 0.97)	0.72 (0.64, 0.81)
Never/infrequent ²	1.00	0.73 (0.65, 0.82)	0.71 (0.54, 0.92)	0.89 (0.51, 1.55)	0.73 (0.65, 0.82)
Frequent ²	1.00	0.61 (0.47, 0.79)	0.62 (0.47, 0.83)	0.55 (0.35, 0.86)	0.61 (0.50, 0.74)
Stroke					
<u>Event/no event (n)</u>					
All	483/14,133	516/20,066	117/3777	49/889	682/24,732
Never/infrequent	-	442/14,849	73/1333	20/158	535/16,340
Frequent	-	74/5217	44/2444	29/731	147/8392
<u>Hazard ratio (95% CI) according to average drinking quantity</u>					
All ¹	1.00	0.96 (0.85, 1.09)	1.02 (0.83, 1.25)	1.72 (1.28, 2.32)	1.00 (0.89, 1.13)
All ²	1.00	0.97 (0.86, 1.11)	1.03 (0.84, 1.27)	1.60 (1.19, 2.17)	1.01 (0.89, 1.14)
Never/infrequent ²	1.00	0.95 (0.83, 1.08)	1.15 (0.90, 1.48)	2.12 (1.35, 3.32)	0.99 (0.87, 1.12)
Frequent ²	1.00	1.11 (0.85, 1.44)	0.83 (0.60, 1.15)	1.34 (0.91, 1.98)	1.04 (0.85, 1.28)

Binge drinking frequency was dichotomised into frequent (heavy episodic drinking; +60 grams of alcohol per occasion at least once per month) and never/infrequent (+60 grams of alcohol per occasion less frequent than once per month). Hazard ratios (HRs) and 95% confidence intervals (CIs) derived from Cox models adjusted for ¹) age and sex; ²) plus education, marital status, smoking, physical activity, body mass index and familial history of coronary heart disease. Participants with intakes <2 g/day and lifetime abstainers constituted the joint reference category. Current

abstainers (n = 2601) and chronic heavy drinkers (n = 104) were included in the overall models, but not in the models stratified by binge drinking frequency.

Web Table 5. The number of events and hazard ratios with 95% confidence intervals for incident ischemic heart disease according to binge drinking frequency and average drinking frequency among 54,962 participants in a cardiovascular health examination survey in midlife (1987 – 2003) who reported to be currently drinking alcohol.

<i>Binge drinking frequency</i>	<i>Average drinking frequency</i>				
	<i>Infrequent</i>	<i>1/month – 1/week</i>	<i>2 – 3/week</i>	<i>≥4 week</i>	<i>1/month – ≥4 week</i>
<u>Event/no event (n)</u>					
All	730/11,35	1323/29,551	417/9051	128/2406	1868/41,008
Never/infrequent	–	1069/23,153	243/4981	78/1193	1390/29,327
Frequent	–	254/6398	174/4070	50/1213	478/11,681
<u>HR (95% CI) according to binge drinking frequency[§]</u>					
Never/infrequent	–	1.00	1.00	1.00	1.00
Frequent ¹	–	1.19 (1.03, 1.38)	1.10 (0.88, 1.36)	0.66 (0.45, 0.98)	1.02 (0.92, 1.14)
Frequent ²	–	1.00 (0.86, 1.16)	0.95 (0.76, 1.18)	0.61 (0.41, 0.90)	0.90 (0.81, 1.01)
Frequent ³	–	–	–	–	0.96 (0.85, 1.07)
<u>HR (95% CI) according to average drinking frequency*</u>					
All ¹	1.00	0.82 (0.75, 0.90)	0.68 (0.60, 0.77)	0.57 (0.47, 0.69)	0.77 (0.70, 0.84)
All ²	1.00	0.86 (0.79, 0.95)	0.75 (0.66, 0.85)	0.65 (0.53, 0.78)	0.82 (0.75, 0.90)
All ³	1.00	0.87 (0.79, 0.95)	0.76 (0.67, 0.87)	0.66 (0.54, 0.80)	0.84 (0.77, 0.92)
Never/infrequent ³	1.00	0.86 (0.79, 0.95)	0.74 (0.64, 0.86)	0.74 (0.58, 0.94)	0.84 (0.76, 0.92)
Frequent ³	1.00	0.83 (0.71, 0.97)	0.76 (0.64, 0.91)	0.54 (0.40, 0.73)	0.76 (0.67, 0.87)

Binge drinking frequency was dichotomised into frequent (heavy episodic drinking; +60 grams of alcohol per occasion at least once per month) and never/infrequent (+60 grams of alcohol per occasion less frequent than once per month). Hazard ratios (HRs) and 95% confidence intervals (CIs) derived from Cox models adjusted for ¹) age and sex; ²) plus education, marital status, smoking, physical activity, body mass index and familial history of coronary heart disease; ³) plus average drinking frequency or binge drinking frequency, as appropriate. [§]Infrequent drinkers (<once/month) were not included in analyses comparing binge drinking frequency directly, but used as the reference category in analyses of drinking frequency.

Web Table 6. The number of events and hazard ratios with 95% confidence intervals for incident stroke according to binge drinking frequency and average drinking frequency among 54,962 participants in a cardiovascular health examination survey in midlife (1987 – 2003) who reported to be currently drinking alcohol.

Binge drinking frequency	Average drinking frequency				
	Infrequent	1/month – 1/week	2 – 3/week	≥4 week	1/month – ≥4 week
All events					
<u>Event/no event (n)</u>					
All	510/11,576	988/29,886	369/9099	152/2382	1509/41,367
Never/infrequent	–	827/23,395	221/5003	88/1183	1136/29,581
Frequent	–	161/6491	148/4096	64/1199	373/11,786
<u>HR (95% CI) according to binge drinking frequency[§]</u>					
Never/infrequent	–	1.00	1.00	1.00	1.00
Frequent ¹	–	1.22 (1.02, 1.46)	1.42 (1.13, 1.79)	0.90 (0.63, 1.27)	1.24 (1.10, 1.41)
Frequent ²	–	1.08 (0.90, 1.29)	1.29 (1.02, 1.63)	0.89 (0.62, 1.26)	1.13 (1.00, 1.28)
Frequent ³	–	–	–	–	1.11 (0.97, 1.27)
<u>HR (95% CI) according to average drinking frequency*</u>					
All ¹	1.00	0.98 (0.88, 1.10)	1.00 (0.87, 1.15)	1.07 (0.89, 1.29)	1.00 (0.90, 1.10)
All ²	1.00	1.02 (0.91, 1.14)	1.06 (0.92, 1.22)	1.15 (0.95, 1.39)	1.04 (0.93, 1.15)
All ³	1.00	1.00 (0.90, 1.12)	1.02 (0.88, 1.19)	1.10 (0.90, 1.34)	1.01 (0.91, 1.13)
Never/infrequent ³	1.00	1.01 (0.90, 1.13)	0.97 (0.82, 1.14)	1.11 (0.88, 1.40)	1.01 (0.90, 1.12)
Frequent ³	1.00	1.02 (0.84, 1.24)	1.18 (0.97, 1.44)	1.15 (0.87, 1.51)	1.10 (0.95, 1.28)

Binge drinking frequency was dichotomised into frequent (heavy episodic drinking; +60 grams of alcohol per occasion at least once per month) and never/infrequent (+60 grams of alcohol per occasion less frequent than once per month). Hazard ratios (HRs) and 95% confidence intervals (CIs) derived from Cox models adjusted for ¹) age and sex; ²) plus education, marital status, smoking, physical activity, body mass index and familial history of coronary heart disease; ³) plus average drinking frequency or binge drinking frequency, as appropriate. [§]Infrequent drinkers (<once/month) were not included in analyses comparing binge drinking frequency directly, but used as the reference category in analyses of drinking frequency.

Web Table 7. The number of events and hazard ratios with 95% confidence intervals for incident ischemic heart disease and stroke according to binge drinking frequency among 25,582 participants reporting binge drinking the last year in when attending a cardiovascular health examination survey in midlife (1987 – 2003).

		<u>Binge drinking frequency</u>			
		Not last year (not included)	A few times last year (n = 16,181)	1 – 3 times per month (n = 7420)	Once a week or more (n = 1981)
Ischemic heart disease					
Event/no event (n)			444/15,737	143/7277	53/1928
HR (95% CI) ¹	-		1.00	0.79 (0.65, 0.99)	1.04 (0.78, 1.38)
HR (95% CI) ²	-		1.00	0.79 (0.65, 0.95)	0.97 (0.73, 1.30)
HR (95% CI) ³	-		1.00	0.83 (0.68, 1.02)	1.03 (0.77, 1.39)
Stroke					
Event/no event (n)			332/15,849	138/7282	37/1944
HR (95% CI) ¹	-		1.00	1.12 (0.92, 1.37)	1.10 (0.78, 1.55)
HR (95% CI) ²	-		1.00	1.11 (0.90, 1.35)	1.03 (0.73, 1.46)
HR (95% CI) ³	-		1.00	1.13 (0.92, 1.40)	1.06 (0.75, 1.51)

Hazard ratios (HRs) and 95% confidence intervals (CIs) derived from Cox models adjusted for 1) age and sex; 2) plus education, marital status, smoking, physical activity, body mass index and familial history of coronary heart disease; 3) plus average drinking quantity.

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