Risk of alcohol

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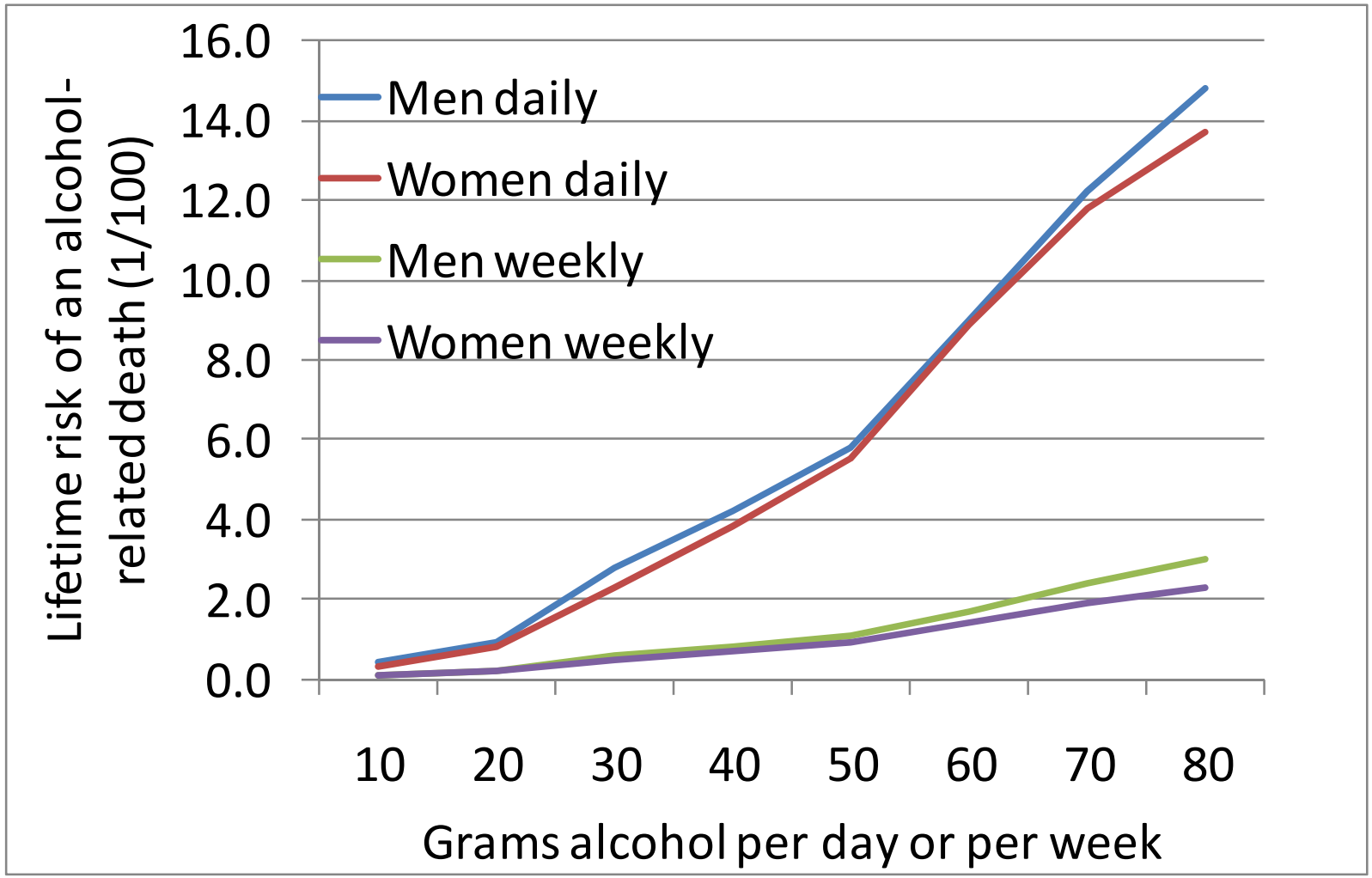

Lifetime risk of dying from alcohol-related death by gram alcohol/day or /week for Australian men and women.

Source: National Health and Medical Research Council, Australia, 2009

How can this be?

Is it really the case that the risks for men and women are the same?

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2. What about heart disease?
3. What do the risk curves mean?

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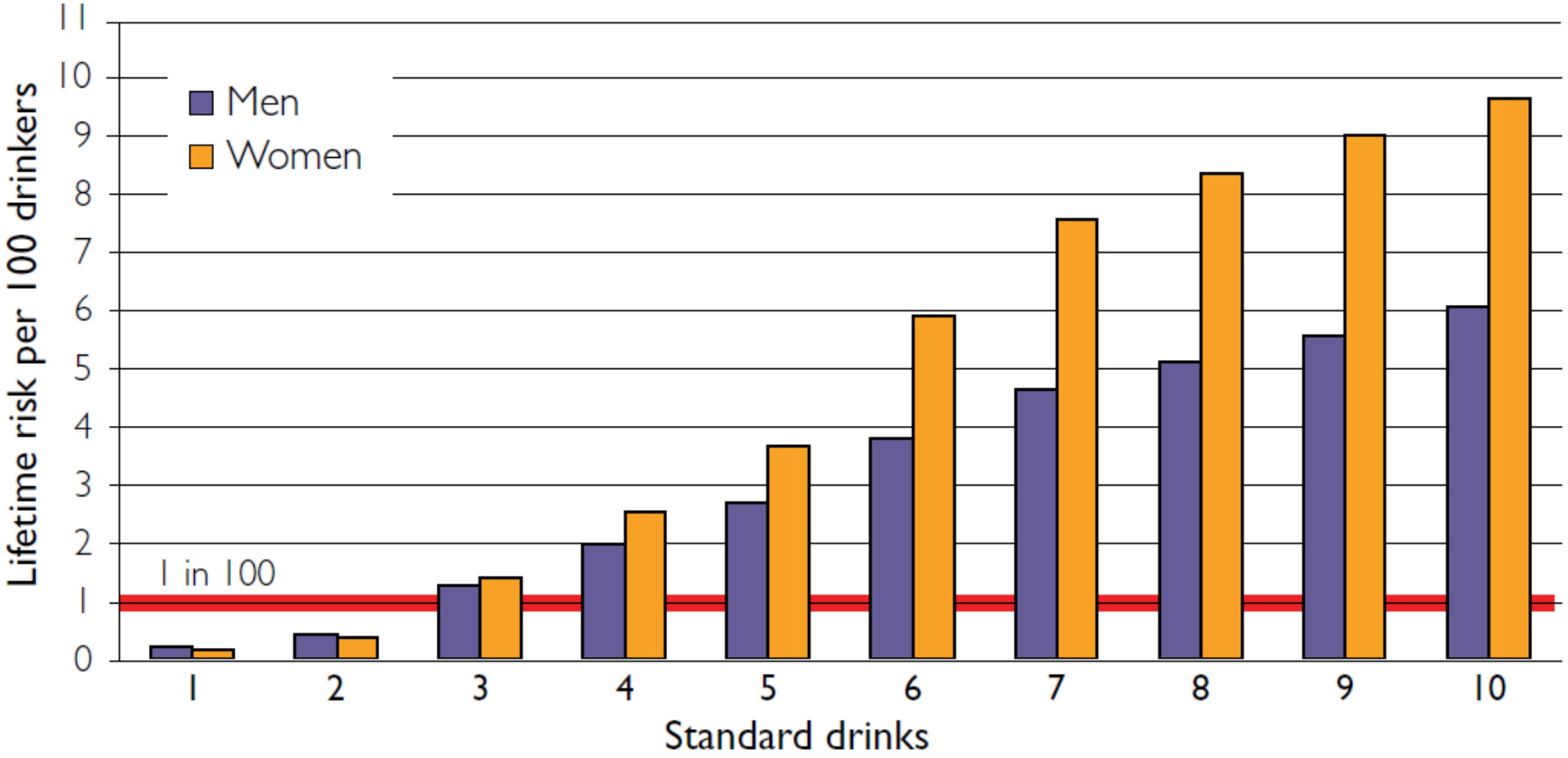


Figure 5 Lifetime risk of death from alcohol-related disease per 100 drinkers, by number of standard drinks per occasion, Australia 2002

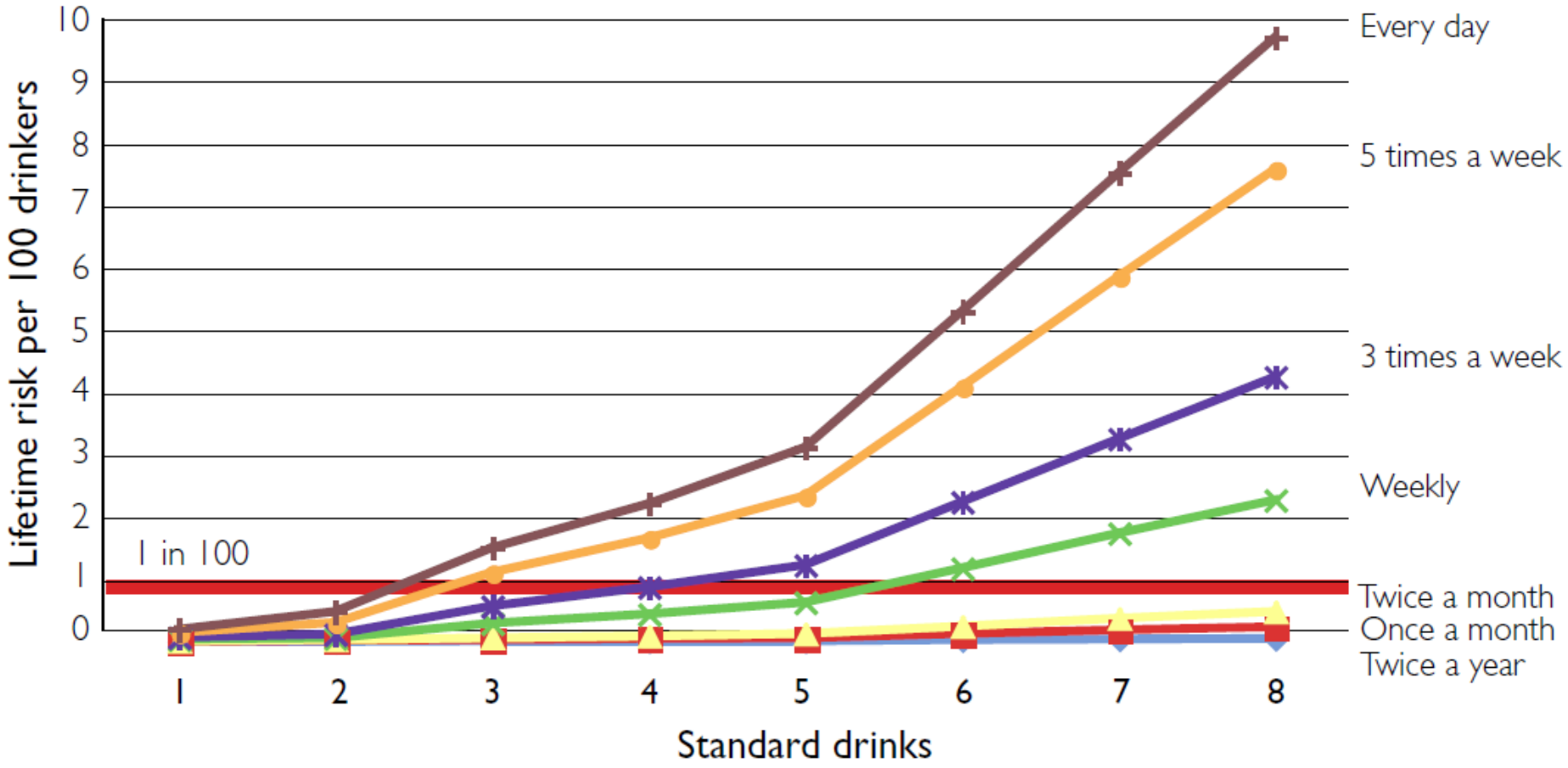


Figure 6 Lifetime risk of death from alcohol-related injury per 100 male drinkers, by number of standard drinks per occasion and frequency of occasions

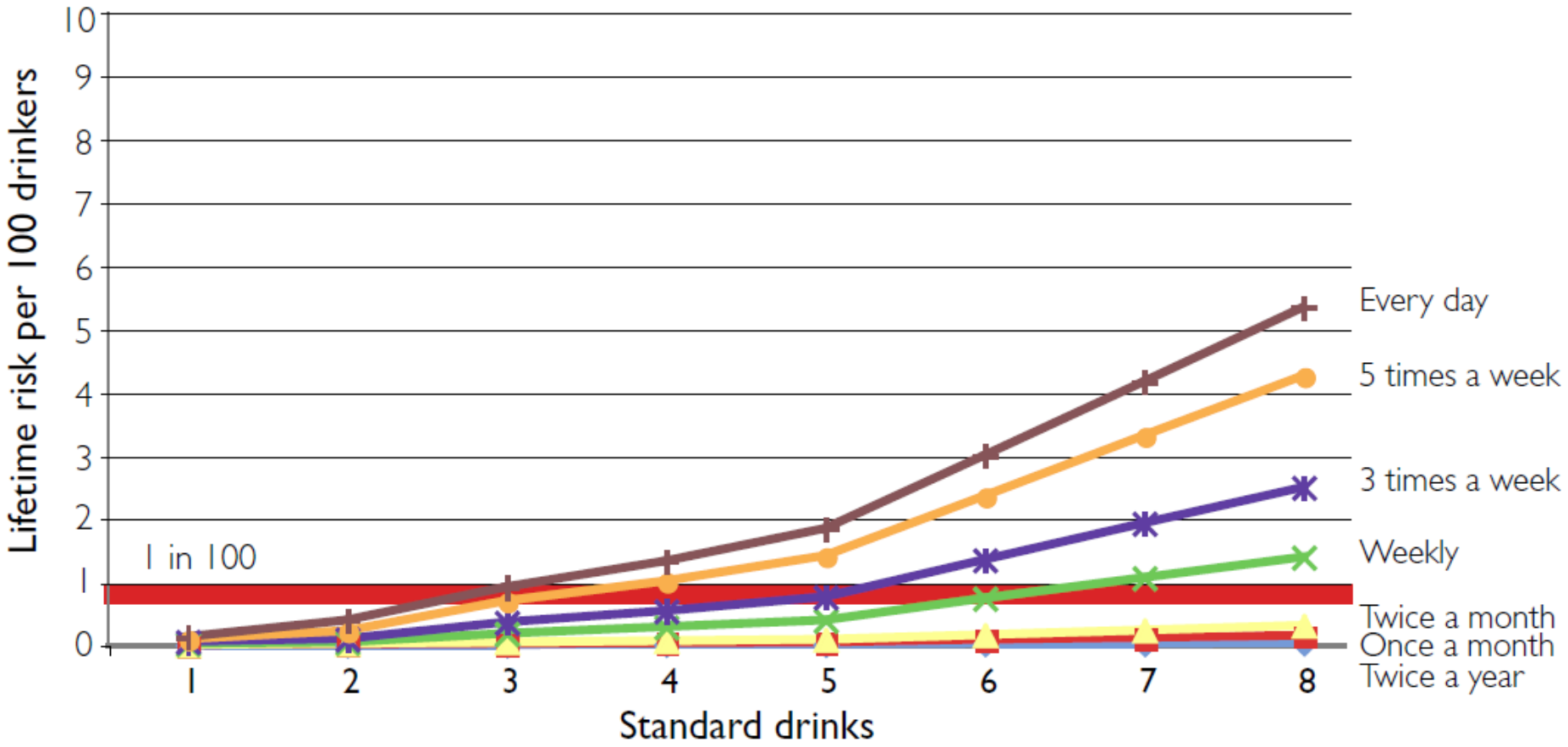


Figure 7 Lifetime risk of death from alcohol-related injury per 100 female drinkers, by number of standard drinks per occasion and frequency of occasions

Let us first look at non-injury alcohol-related diseases

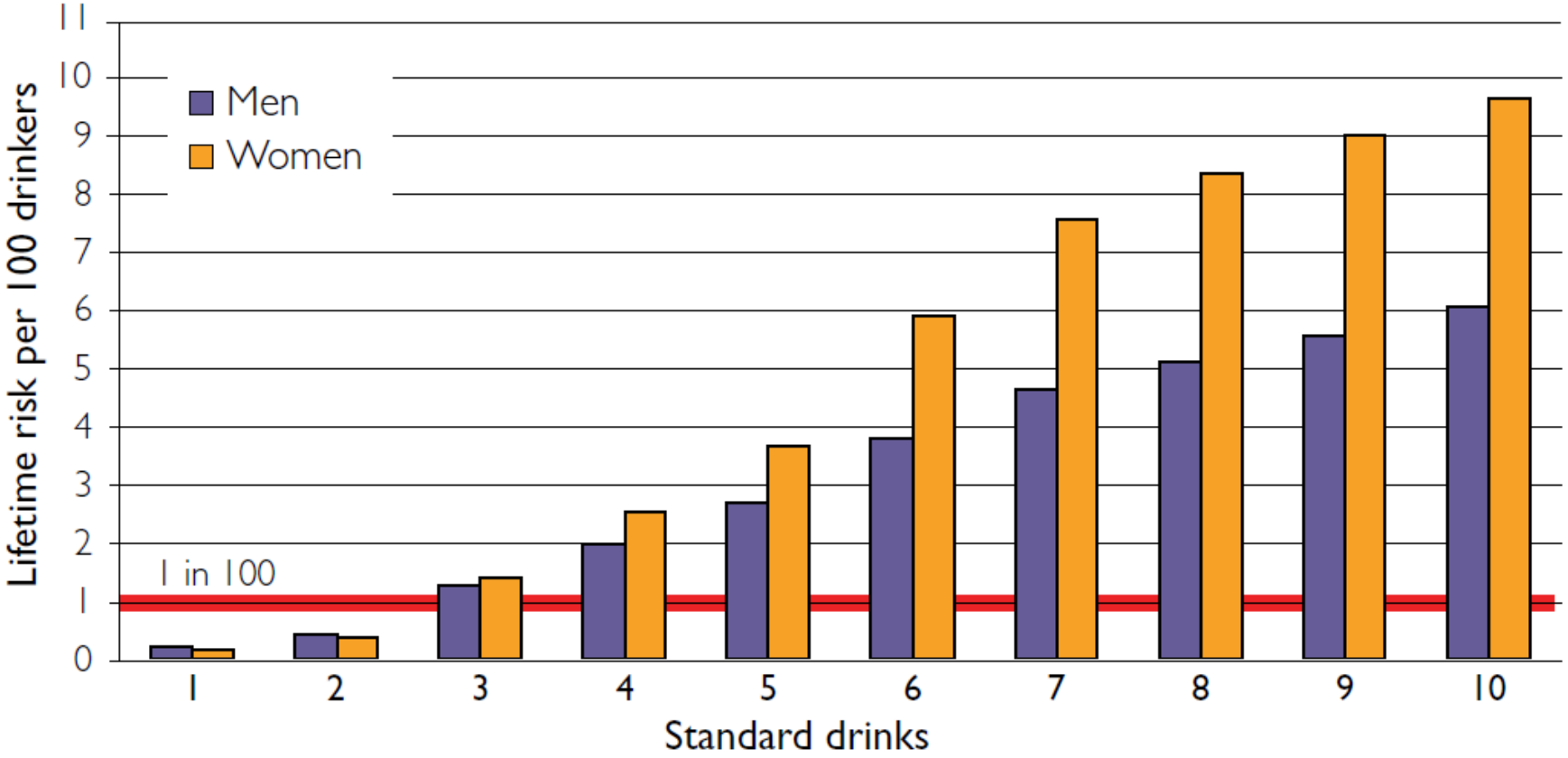


Figure 5 Lifetime risk of death from alcohol-related disease per 100 drinkers, by number of standard drinks per occasion, Australia 2002

For each of the 10 consumption categories, need to work out life time risk of a death caused by alcohol

To do this, first, take the population (in this case Australian), and divide into men and women and 6 age groups, 15-29, 30-44, 45-59, 60-69, 70-79 and 80+ years.

For each gender and age group, calculate, from death certificates, annual mortality rates for the specified diseases, multiplied by the number of years in the age group.

For example, for women aged 30-44, their one year risk is multiplied by 15, as they are in this category for 15 years.

From this, then work out the proportion of deaths (and thus death rates) due to alcohol for each of the 10 drinking categories

Did this by getting the relative risks for the diseases under question for each of the consumption categories compared with no consumption from published meta-analyses. Here they are:

	Relative risks (by standard drinks per day)[a]									
Disease conditions	1	2	3	4	5	6	7	8	9	10
Lip, oral and pharyngeal cancer	1.31 1.33	1.67 1.72	2.08 2.18	2.53 2.69	3.02 3.26	3.53 3.88	4.06 4.52	4.58 5.19	5.09 5.85	5.57 6.51
Oesophageal cancer	1.17	1.37	1.61	1.88	2.19	2.55	2.95	3.42	3.94	4.52
Liver cancer	1.08	1.15	1.23	1.31	1.40	1.48	1.56	1.65	1.73	1.81
Breast cancer	1.08	1.17	1.26	1.36	1.47	1.58	1.71	1.85	1.99	2.15
Ischaemic heart disease[b]	*	*	*	*	*	*	*	1.01	1.03	1.13
Ischaemic stroke[b]	*	*	*	1.12	1.4	1.73	2.04	2.21	2.12	1.72
Haemorrhagic stroke	1.16	1.35	1.57	1.82	2.12	2.46	2.86	3.32	3.86	4.48
Cirrhosis of liver	1.21 1.32	1.45 1.73	1.72 2.25	2.02 2.89	2.35 3.68	2.71 4.64	3.1 5.8	3.51 7.17	3.94 8.80	4.38 10.69

From this, can calculate alcohol attributable fractions (AAF), using the formula:

$$AAFi = P^* (RRi - 1) / [P^* (RRi - 1) + 1]$$

Where:
i: level of drinking (i.e. 10g pure alcohol per day…. 100g pure alcohol per day)
P: prevalence of alcohol consumption in the drinking category.
RRi: relative risk for drinking level i

Here are the AAFs:

1	2	3	4	5	6	7	8	9	10
Lip, oral and pharyngeal cancer									
23.5	40.0	51.9	60.5	66.9	71.7	75.4	78.2	80.4	82.1
24.7	41.9	54.0	62.9	69.4	74.2	77.9	80.7	82.9	84.6
Oesophageal cancer									
14.6	27.1	37.7	46.7	54.3	60.7	66.1	70.7	74.6	77.9
Laryngeal cancer									
7.0	13.3	18.9	23.9	28.4	32.4	36.0	39.2	42.1	44.7
Breast cancer									
7.4	14.2	20.6	26.4	31.9	36.9	41.5	45.9	49.9	53.6
Hypertensive diseases									
13.3	24.8	34.8	43.4	50.9	57.4	63.1	68.0	72.2	75.9
Ischaemic heart disease									
*	*	*	*	*	*	*	1.0	2.9	11.5
Ischaemic stroke									
*	*	*	10.9	28.3	42.0	51.0	54.8	52.8	41.8
Haemorrhagic stroke									
13.9	25.9	36.2	45.1	52.8	59.3	65.0	69.9	74.1	77.7
Cirrhosis of liver									
17.3	31.0	41.8	50.5	57.5	63.2	67.8	71.5	74.6	77.1
24.4	42.2	55.5	65.4	72.8	78.4	82.7	86.1	88.6	90.6

Then, for each total mortality rate, multiply the total mortality rate by the AAF to give the alcohol mortality rate.

Then, add up the risks over diseases and age groups to give lifetime risk by consumption category. Here is the graph again.

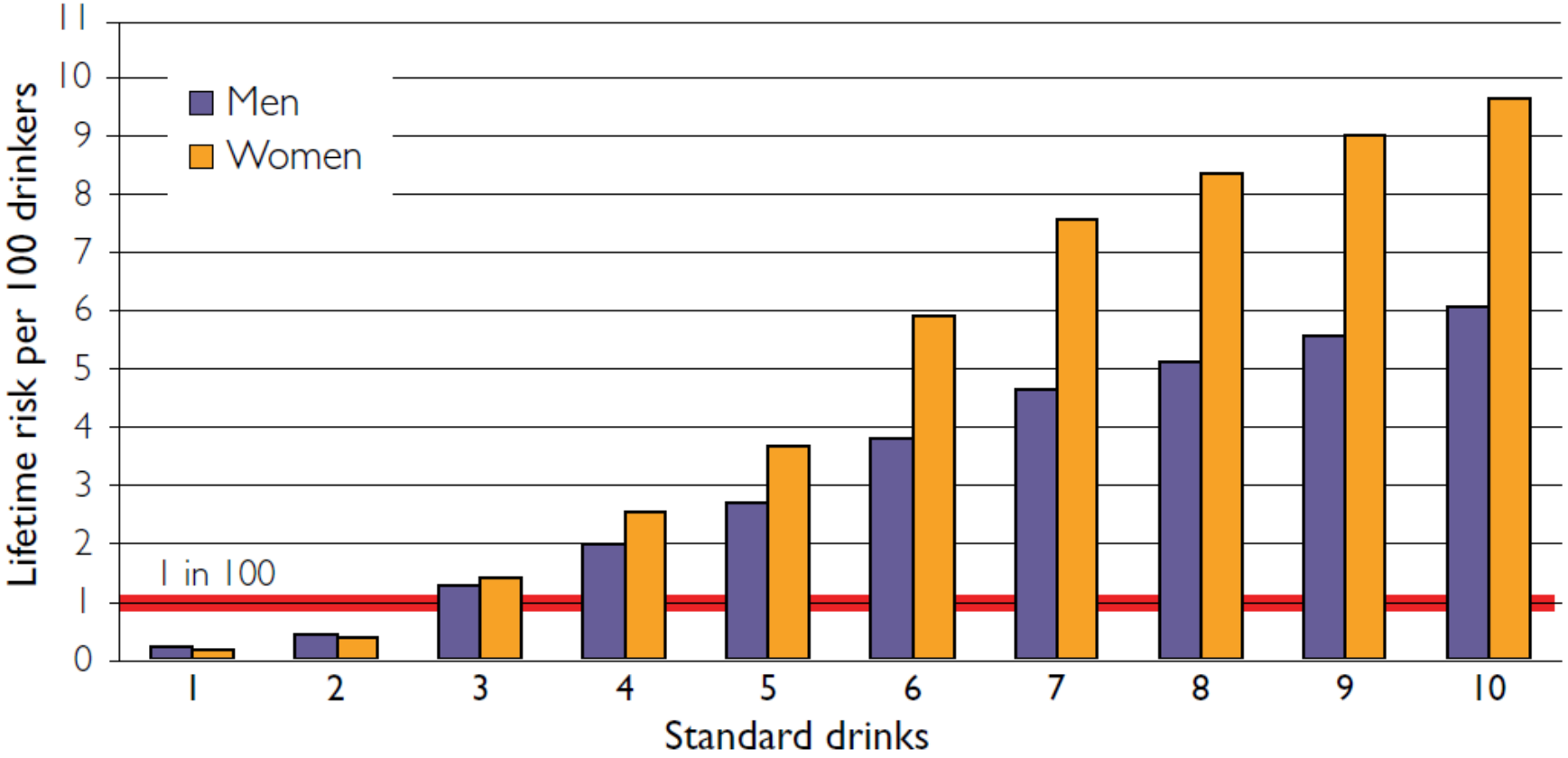


Figure 5 Lifetime risk of death from alcohol-related disease per 100 drinkers, by number of standard drinks per occasion, Australia 2002

The method of injury deaths is similar, but a little more complicated, as it needs to account for both the number of drinking occasions and the amount drunk per occasion, as well as the risk period (the time that alcohol remains in the body after a drinking occasion and thus increases risk of injury).

First, take Alcohol Attributable Fractions (AAF) by age group for injuries from an Australian study. Here they are:

15–29 Yrs		30–44 Yrs		45–59 Yrs		60–69 Yrs		70–79 Yrs		80+ Yrs	
M	F	M	F	M	F	M	F	M	F	M	F
Road traffic accidents											
30.5	10.7	30.5	10.7	30.5	10.7	30.5	10.7	30.5	10.7	30.5	10.7
Poisoning											
29.0	23.0	16.0	15.0	16.0	15.0	16.0	15.0	8.0	7.0	8.0	7.0
Falls											
22.0	14.0	22.0	14.0	22.0	14.0	12.0	04.0	12.0	04.0	12.0	4.0
Fire											
44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0
Drowning											
34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
Other unintentional injuries											
29.0	23.0	29.0	23.0	24.0	19.0	24.0	19.0	24.0	19.0	24.0	19.0
Suicide											
32.3	28.5	32.3	28.5	32.3	28.5	32.3	28.5	32.3	28.5	32.3	28.5
Violence (homicide)											
27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0
Other intentional injuries											
20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0

Next, calculate the baseline rate for injury death without alcohol, being the total death rate minus (the total death rate times the AAF).

The Relative Risks for injury following a drinking occasion by alcohol consumption were obtained from a WHO 10 country study of emergency departments. Here they are:

After conversion (Australian 10g standard drinks)	
Number of drinks	**OR**
0	1.0
1	1.9
3	3.8
5	5.6
7+	10.1

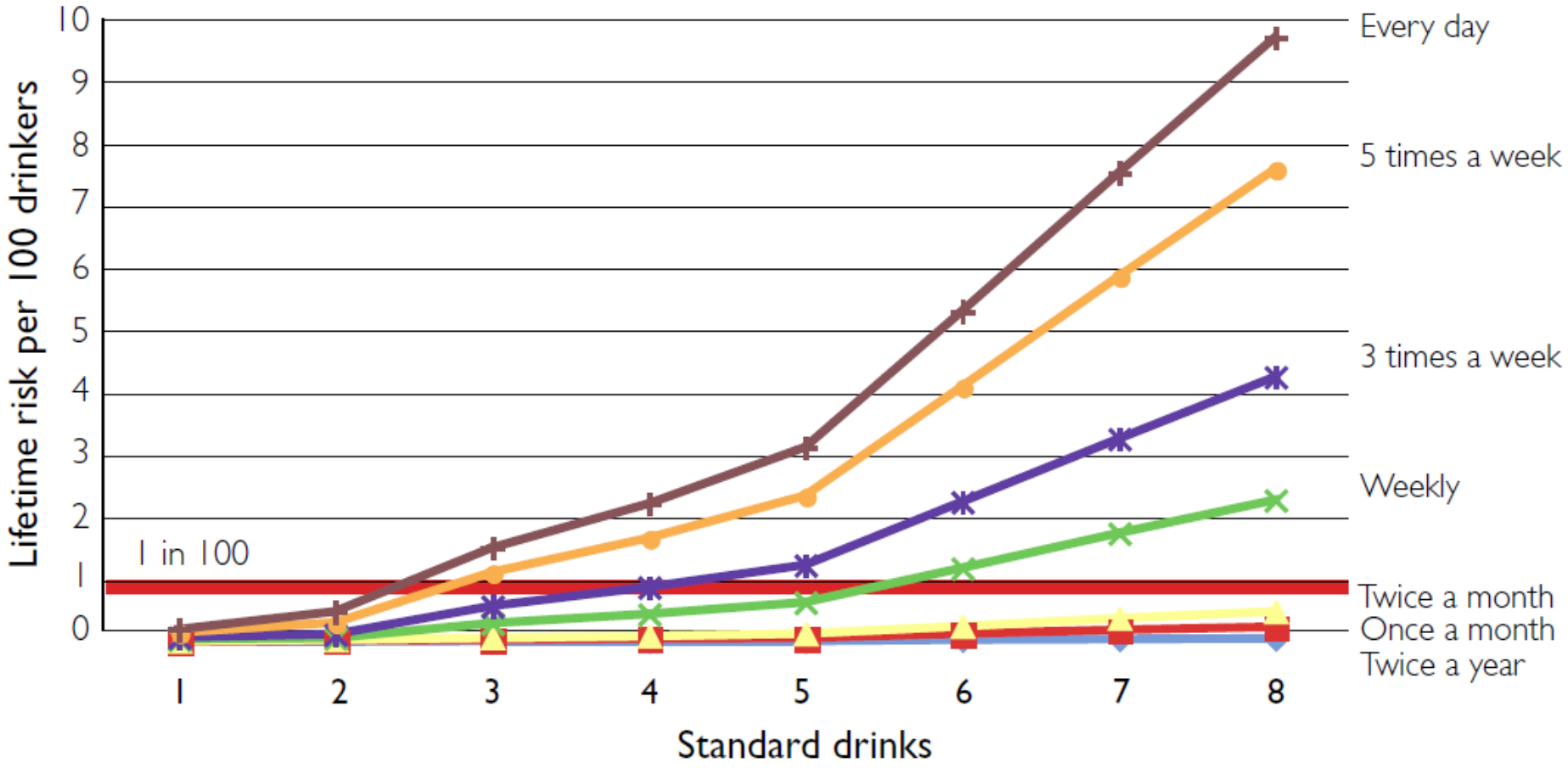
For each amount per occasion, combine the baseline risk with the alcohol-based relative risk for one occasion to give the absolute risk of injury death per one drinking occasion related to consumption categories.

And, then multiply by the number of lifetime drinking occasions, ranging from 50 to 20,000, corresponding from a range of one drinking occasion per year to one drinking occasion per day.

Of course, need to adjust for the period of risk resulting form a drinking occasion. This period relates to the time that alcohol is in the blood, not the whole 24 hours of day.

For example, alcohol in blood 3 hours after an intake of 50g – thus, the risk period is 3 hours, not 24 hours.

Probabilities of death are then computed for each age, gender, injury, and consumption group (e.g. the lifetime probability of an alcohol-attributable motor vehicle death for 20–29 year old men who drank approximately 20g alcohol 4 times per week), and added up across injury categories and ages. Here are the graphs again:



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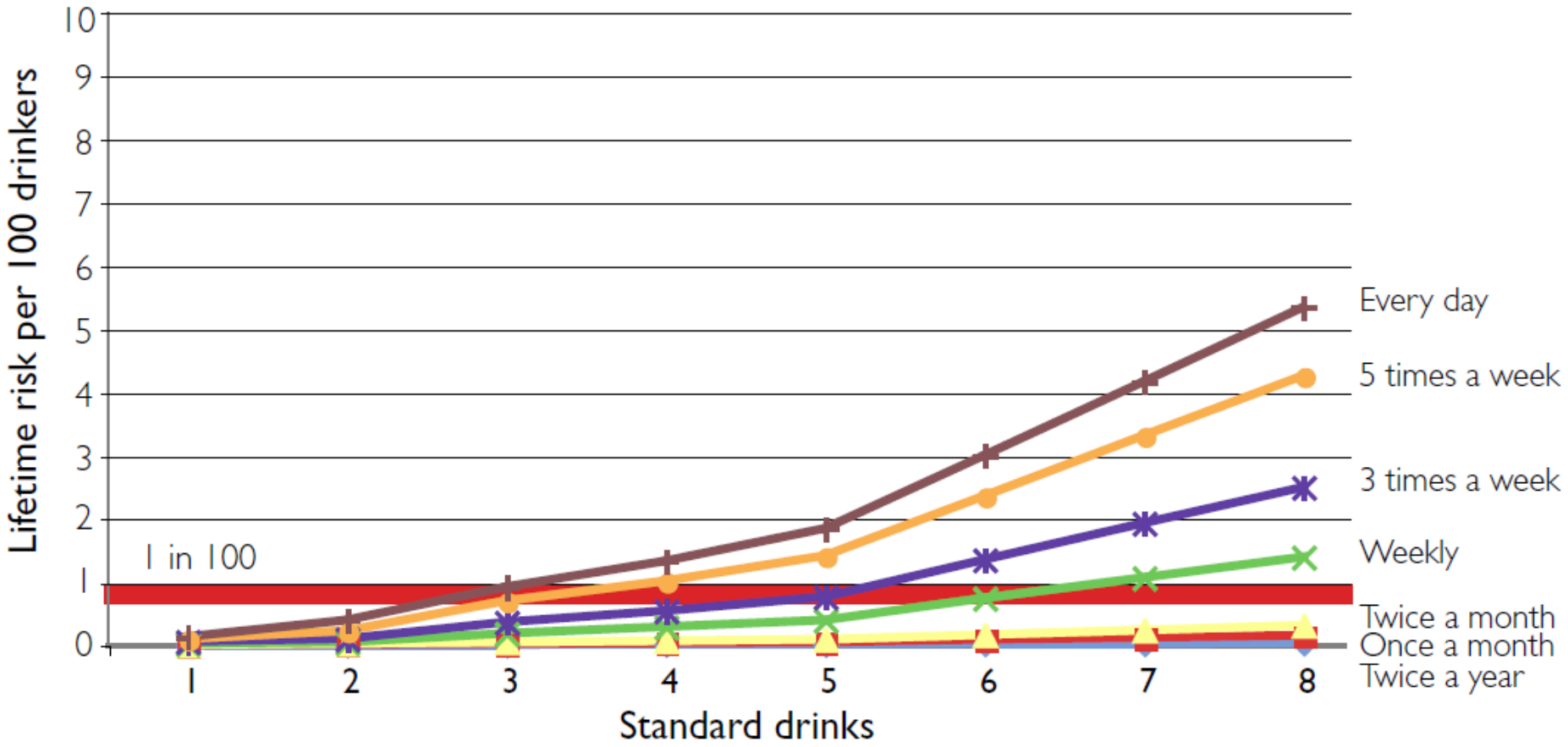

Figure 7 Lifetime risk of death from alcohol-related injury per 100 female drinkers, by number of standard drinks per occasion and frequency of occasions

1. How are the estimates made
2. What about heart disease?
3. What do the risk curves mean?

Whether or not alcohol reduces the risk of ischaemic heart disease (and ischaemic stroke) does not change the absolute risks of the deaths due to alcohol, which are due to adverse events.

In any case, most of the protective effect of alcohol on heart disease can be achieved at 5g alcohol/day, lower than any likely guidelines for lower risk drinking.

Any protective effect disappears when light drinkers report at least just one heavy drinking occasion per month.

And, a protective effect is based on a different conceptual framework from an adverse effect, since more protection can be achieved by engaging in other healthier behaviours (e.g., healthy diet, more physical activity), which incur no added risk.

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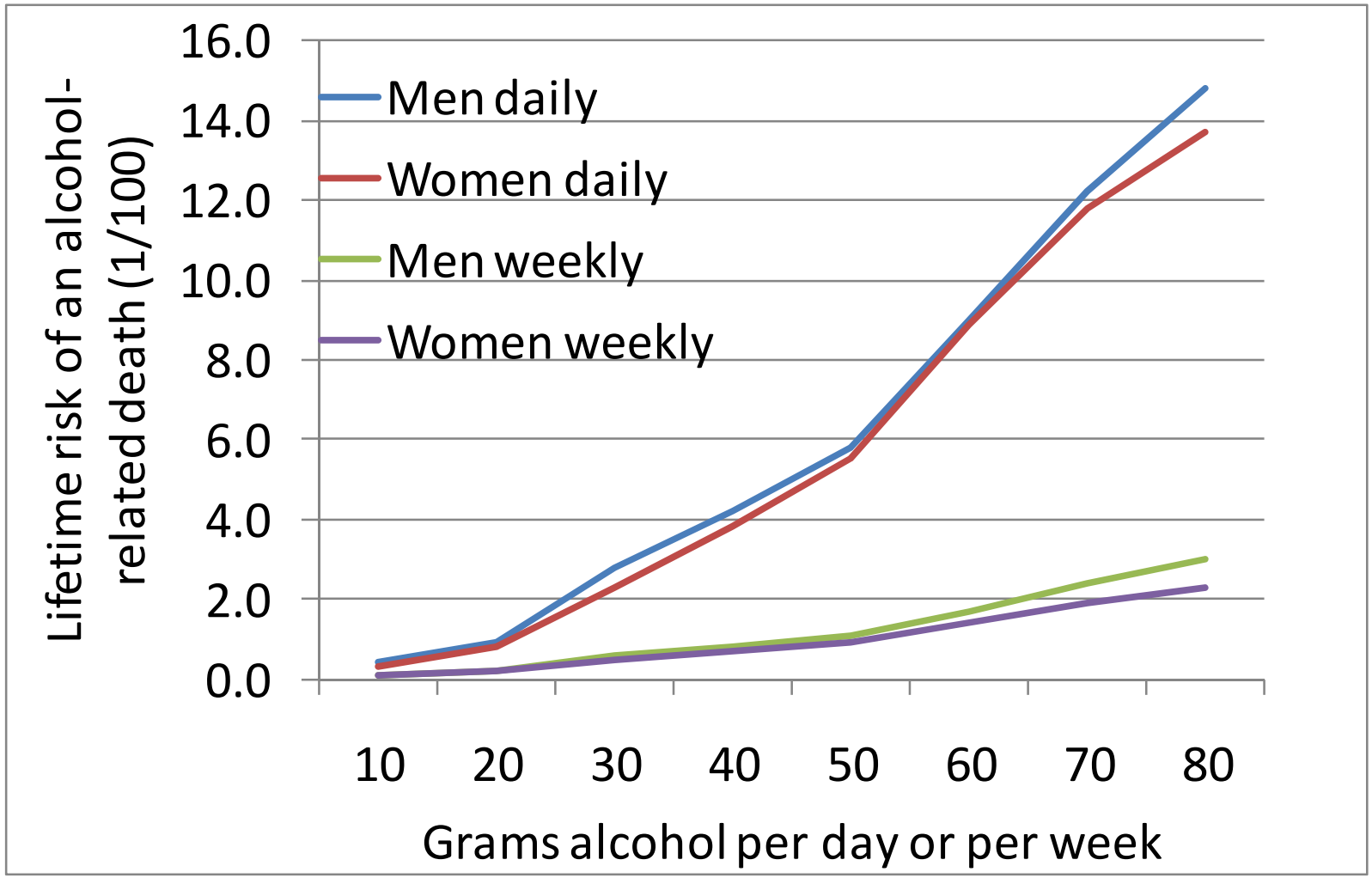

Lifetime risk of dying from alcohol-related death by gram alcohol/day or /week for Australian men and women.

Source: National Health and Medical Research Council, Australia, 2009

The exact slope of the curves is country specific as it depends on the prevalence and distribution of both diseases and drinking patterns in the population - but, for most EU countries, at least, they will be similar to the Australian curves.

At 20g/day, the lifetime risk that death is due to alcohol is less than 1:100 for both men and women.

At 60g/day, the lifetime risk that death is due to alcohol is just under 1:10 for both men and women.

How do the risks compare with other risks?

Well, they are high.

In terms of drinking water, WHO sets a general upper guideline at the concentration which would give rise to a risk of 1 additional cancer per 100,000 people on a lifetime basis.

A study of regulation of risky substances in Canada and US sets thresholds at 1:22,00 and 1:10,000.

Asbestos exposure is estimated to pose a lifetime mortality risk of between 1:1,000 and 1:10,000.

Eating pesticide grown fruit is estimated to pose a lifetime mortality risk of 1:22,000.

The data also suggests that we should talk in terms of risk, and not use terms like safe drinking, sensible drinking, alcohol misuse etc, because these terms do not mean anything.

And, we need to get the risk message across - too many people still think that alcohol is good for you.

And, finally, this is at the individual level – we will deal with the population level tomorrow morning.