Estimating the burden of alcohol on the health of Northern Ireland

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Introduction

In 2023, the University of Sheffield published new analysis of the potential impact of Minimum Unit Pricing and restrictions on the discounting of alcohol on public health in Northern Ireland[1]. Due to a lack of available post-pandemic data, this work primarily used data from 2019 and therefore did not consider the impact that the COVID-19 pandemic has had on health. In June 2025, British Heart Foundation Northern Ireland commissioned the Sheffield Addictions Research Group to use more recent data on hospital admissions and deaths to estimate the burden that alcohol currently places in Northern Ireland. This analysis builds on previous work in England[2] and Scotland[3].

The aim of this project was to estimate new Alcohol-Attributable Fractions for Northern Ireland and to apply these to recent, post-pandemic, data on hospital admissions, associated NHS costs and deaths to estimate the total number that are caused directly by alcohol consumption and how these are distributed in the population.

Methods

An Alcohol-Attributable Fraction (AAF) represents the proportion of cases of, or deaths from, a health condition that would not have happened if nobody in the population drank alcohol. So an AAF of 10% would mean that 1 in 10 cases of that disease are caused by alcohol and there would be 10% fewer cases in the absence of alcohol consumption. AAFs are estimated by combining individual-level data on alcohol consumption with epidemiological evidence on the association between alcohol consumption and risks of disease, accounting for the fact that both patterns of drinking and the prevalence of different diseases varies between population groups. For more details please see Webster et al. 2019[2]. In this report we estimate AAFs for 23 different health conditions for the whole population of Northern Ireland and separately by sex and age (18-34, 35-44, 45-54, 55-64, 65+).

Having estimated new AAFs, we then apply these to the latest available data on hospital admissions and mortality for each of these 23 different conditions, as well as 4 condition groups that are caused entirely by alcohol (often referred to as 'alcohol-specific'): alcohol-related liver disease, alcohol dependence-related conditions, alcohol poisoning and other alcohol-specific conditions. These conditions would not exist in the absence of alcohol consumption and therefore have an AAF of 100%. The result of this process is a series of estimates of the number of admissions and deaths from each condition that are directly caused by alcohol both overall and by age and sex. We also use estimates of the cost to the NHS of an admission from each condition to calculate the total cost of alcohol-attributable admissions.

One important difference in the hospital data used in the present analysis and the data used in the 2023 modelling, other than the years that the data relates to, is that admissions in the current study are classified using what is known as the 'narrow measure' of admissions, whereas previous work used the 'broad measure'[4]. The difference between these measures arises from the fact that each hospital admission episode can have multiple diagnosis codes associated with it – a 'primary' diagnosis that represents the principal condition for which the patient is being treated in that episode of care, and potentially many 'secondary' diagnoses that may be contributory factors to the admission (or in some cases may be incidental to it). The narrow measure considers only admissions where the primary diagnosis is one of the 27 different conditions related to alcohol, except for injuries, which are never recorded as the primary diagnoses – these are included if they feature as a secondary diagnosis. The broad

measure includes all admissions where one of the 27 conditions appears as either primary or secondary diagnosis. Both measures have their limitations – the narrow measure will lead to a smaller number of admissions being recorded against each condition. We can be confident that these are directly linked to the conditions we are interested in, but we are likely to miss some admissions where an alcohol-related conditions played an important contributory role (and potentially without which the admission would not have happened). As such the narrow measure underestimates the extent of alcohol harm. On the other hand, the broad measure captures almost all admissions that can be linked to alcohol, but will also capture some admissions that would still have happened in the absence of alcohol – i.e. it overestimates the extent of alcohol harm. Our estimates of alcohol-attributable hospital admissions are therefore conservative due to our use of the narrow measure.

Finally, in recent decades there has been much debate about whether the so-called 'protective effects' of low levels of alcohol consumption for some health conditions, most notably cardiovascular disease. Whilst there are plausible biological mechanisms whereby low levels of alcohol could reduce risks, there are also many potential confounding factors that could lead studies to falsely show such an effect even if none exists. For example, higher socioeconomic groups are more likely to drink at low levels and are also in better health, on average. Several major studies in the past few years have used new genetic techniques (known as Mendelian Randomisation) to explore this question and found little evidence to support the existence of any protective effects once many of these potential confounders are removed[5–7]. As a result, in this study, we have excluded protective effects from our analysis.

Data

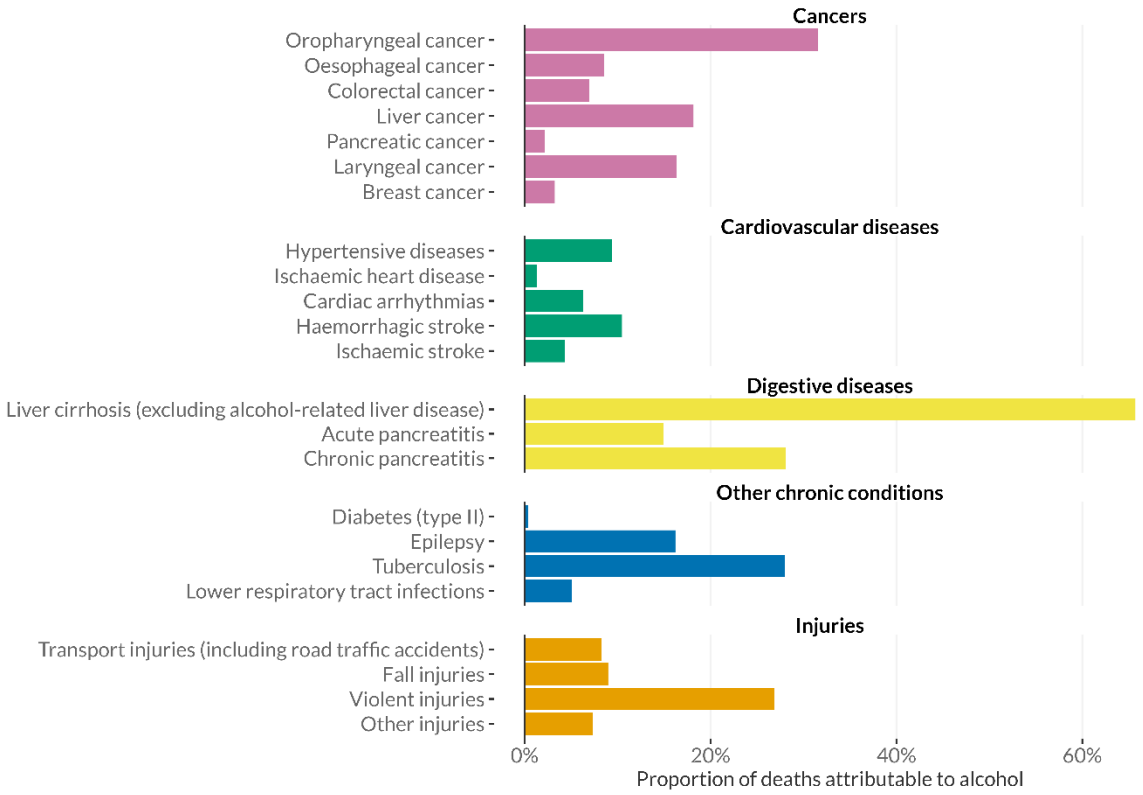
Alcohol consumption data for this analysis comes from the most recent available waves of the Health Survey for Northern Ireland, conducted in 2017/18 and 2019/20. Data on the associations between alcohol consumption and disease risk comes from a broad range of international evidence, described in Angus et al. 2018[8]. Hospital inpatient admissions for alcohol-related health conditions for the years 2022/23 and 2023/24 have been provided by the Department of Health. Cause-specific mortality data for 2023 was taken from the Registrar General Annual Report published by the Northern Ireland Statistics and Research Agency (NISRA). Estimates of the cost to the NHS per admission have been taken from our 2023 analysis, but updated to 2025 prices using healthcare-specific inflation rates[9]. Note that these admissions counts and costs reflect inpatient admissions only. Other admissions and associated healthcare costs, including Accident & Emergency visits or ambulance callouts, are excluded and therefore the estimates presented her represent an underestimate of the full burden that alcohol places on healthcare services in Northern Ireland.

Results

Alcohol-Attributable Fractions for Northern Ireland

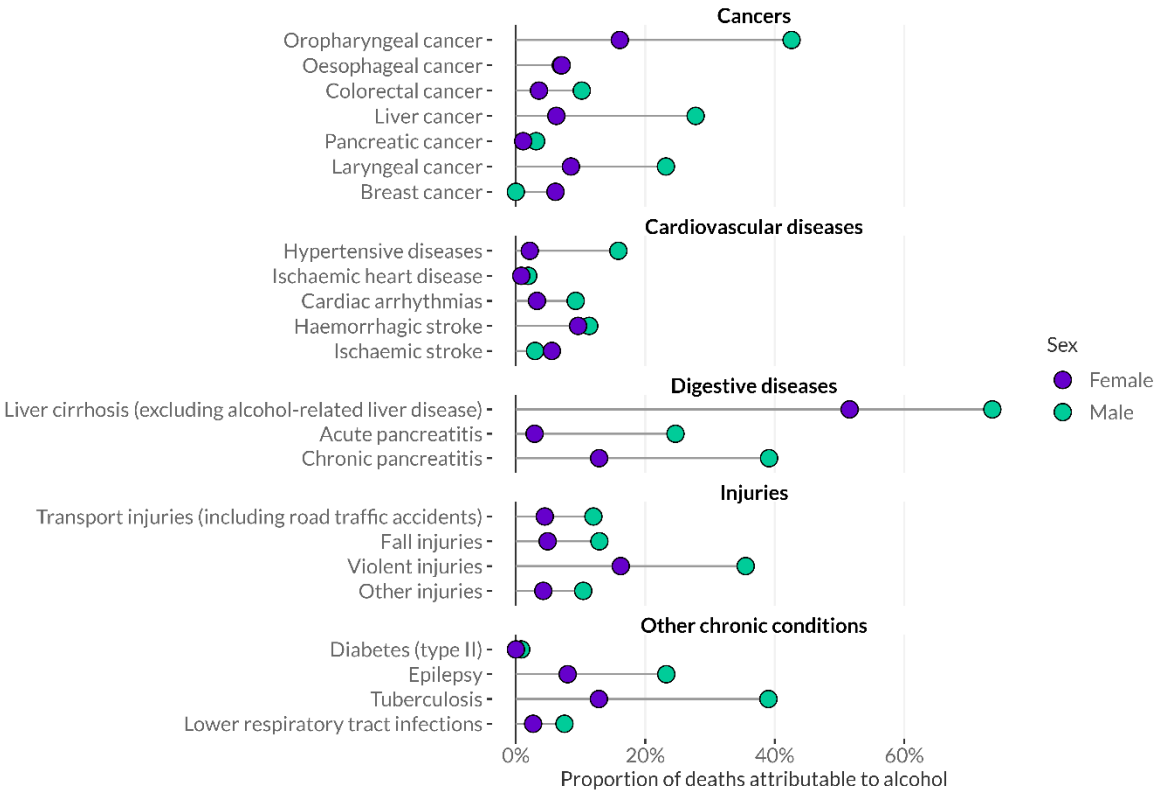
A full list of the estimated AAFs for both hospital admissions and mortality can be found in Tables S1 and S2 respectively at the end of this report. A summary of the AAFs for mortality by condition in the overall population is shown in Figure 1. This illustrates that by far the highest AAF is for liver cirrhosis (excluding alcohol-related liver disease, which by definition has an AAF of 100%), with almost two thirds (65.7%) of deaths from this condition being directly due to alcohol consumption. The next highest AAF is for oropharyngeal cancer (cancer of the mouth and upper throat) at just under one third (31.6%) followed by chronic pancreatitis (28.1%), tuberculosis (28.0%) and violent injuries (26.9%), illustrating the substantial role that alcohol plays in mortality rates from these causes.

Figure 1: Population Alcohol-Attributable Fractions for mortality



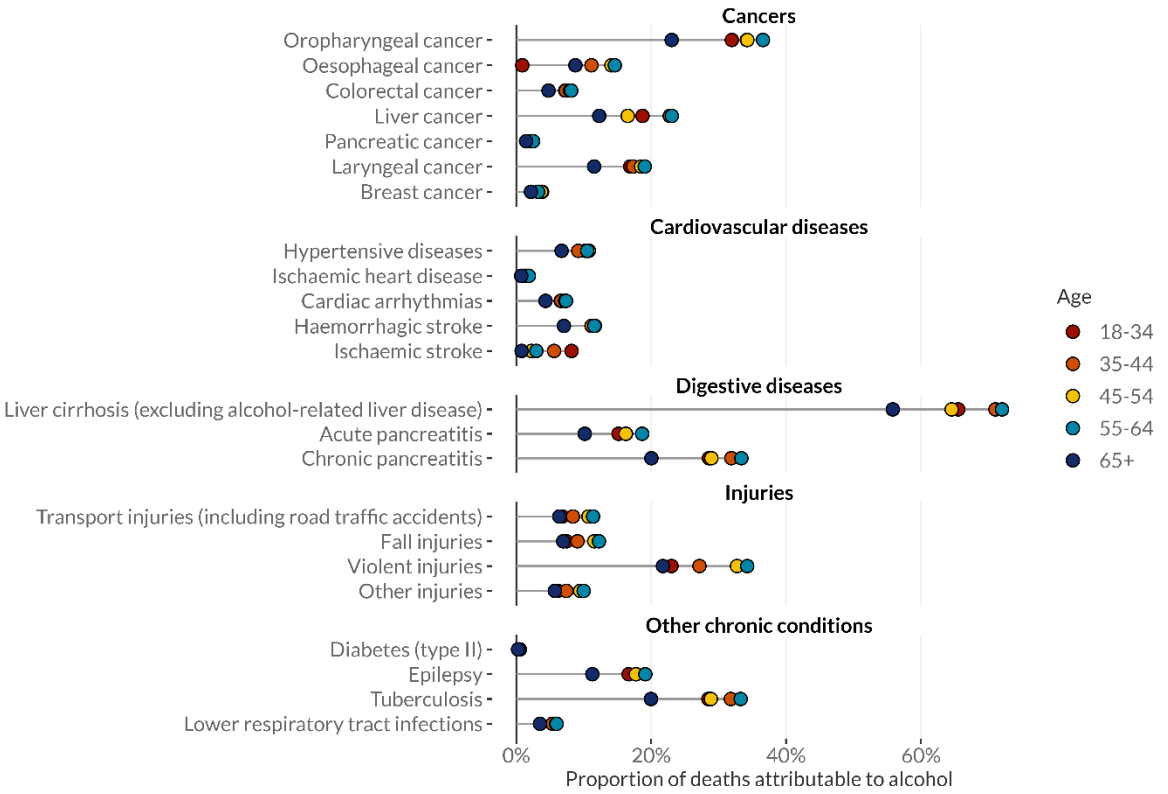
How the contribution of alcohol to mortality from each condition differs by sex is shown in Figure 2. This shows that higher rates of heavy drinking in men mean that the proportion of deaths in men from almost every alcohol-related condition that are directly caused by alcohol is higher than in women.

Figure 2: Alcohol-Attributable Fractions for mortality by sex



Finally, the variation in AAFs by age is shown in Figure 3. For almost all conditions alcohol makes the largest relative contribution to mortality rates in 55-64 year olds. This is as a result of this age group being the most likely to exceed the low-risk drinking guidelines.

Figure 3: Alcohol-Attributable Fractions for mortality by age



Deaths caused by alcohol

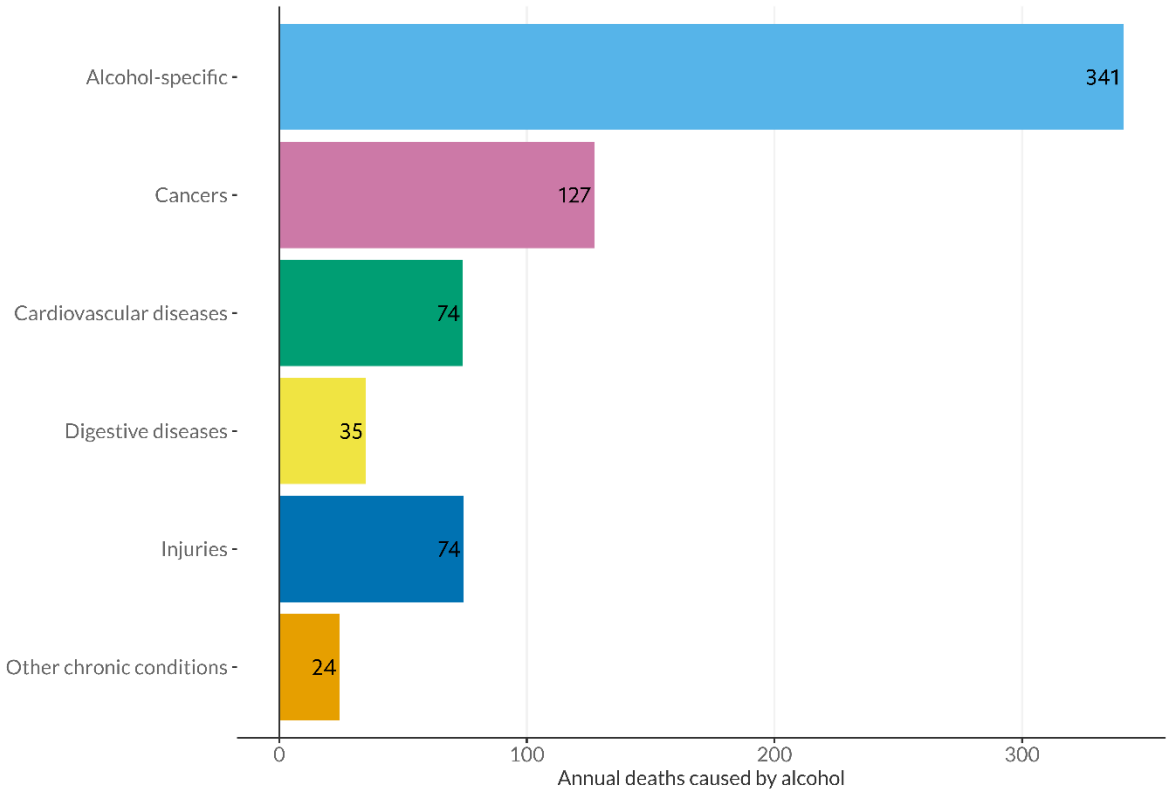
The estimated annual deaths in Northern Ireland that are directly caused by alcohol are shown in Table 1 and the overall population figures illustrated in Figure 4. These show that an estimated 676 people each year in Northern Ireland die as a direct result of their alcohol consumption. Around half of these deaths (341) are from alcohol-specific causes that are, by definition, caused by alcohol consumption. However, the remainder of these deaths are from conditions where alcohol is not the only cause, but plays a contributory role. This highlights how counting only alcohol-specific deaths is likely to underestimate the true mortality burden of alcohol by almost a half. These figures also demonstrate the substantial contribution that alcohol makes to cancer risks, with 127 people dying each year from cancers brought on by alcohol consumption.

Table 1: Estimated annual alcohol-attributable deaths in Northern Ireland[1]

		Sex		Age				
	Population	Female	Male	18-34	35-44	45-54	55-64	65+
Alcohol-specific	341	120	221	5	31	99	121	85
Cancers	127	35	92	0	2	10	31	85
Cardiovascular diseases	74	18	56	0	1	4	12	57
Digestive diseases	35	10	25	0	1	3	11	20
Injuries	74	14	60	12	8	12	12	29
Other chronic conditions	24	7	17	1	1	1	2	19
Total	676	205	471	19	44	129	189	295

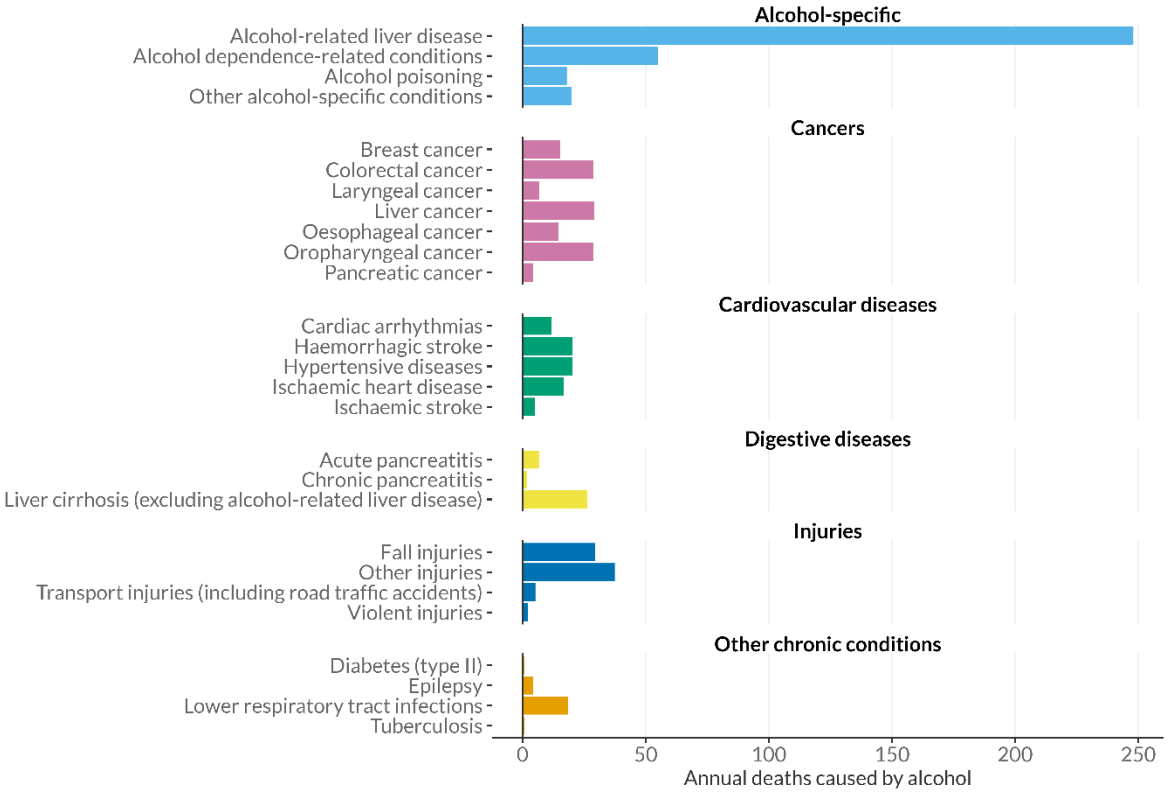
[1] Note that in this and all subsequent Tables in this report, sex-age and condition-specific figures may not sum exactly to the population totals due to rounding.

Figure 4: Estimated annual deaths due to alcohol by condition group



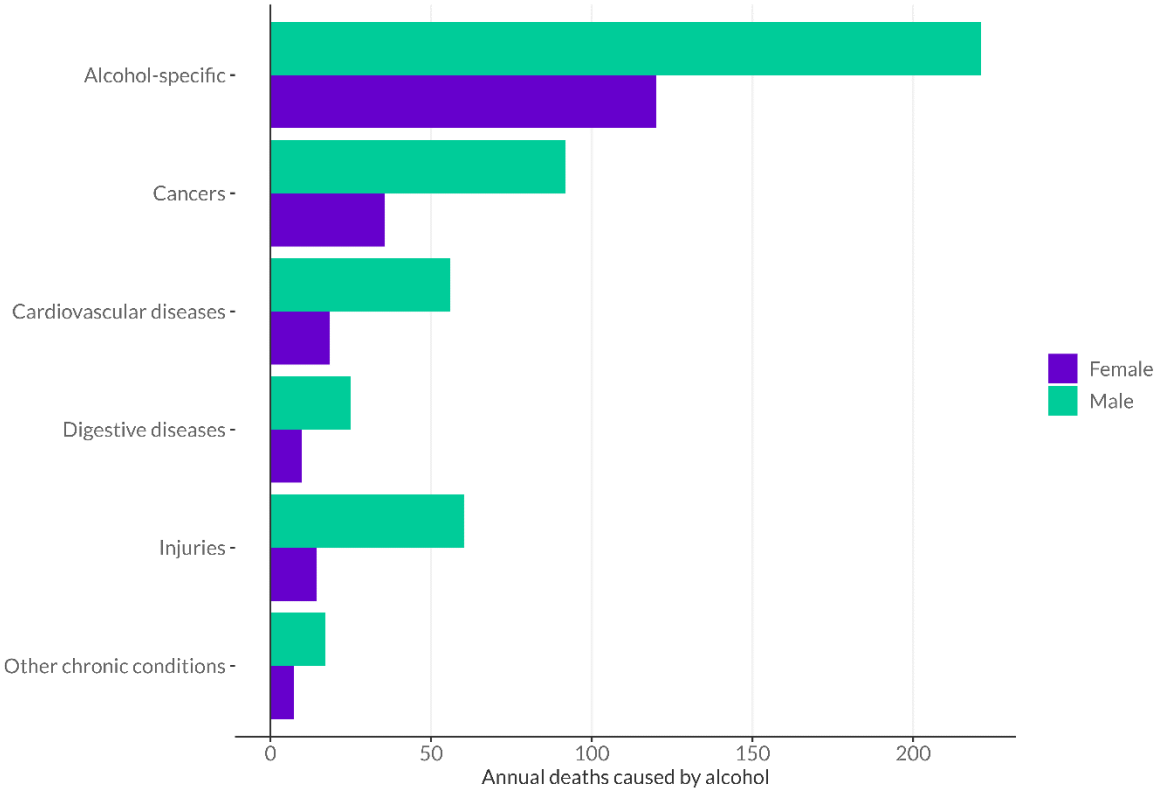
A breakdown of these deaths by specific cause is shown in Figure 5, with the underlying numbers presented in Table S3. This shows that alcohol-related liver disease is by far the single largest cause of alcohol-attributable deaths, accounting for 248 deaths per year, over a third (36.7%) of the total. It also illustrates the breadth of conditions where alcohol plays a direct role in increasing mortality rates in Northern Ireland, including injuries, 7 different cancers and a range of cardiovascular conditions.

Figure 5: Estimated annual deaths due to alcohol by specific cause



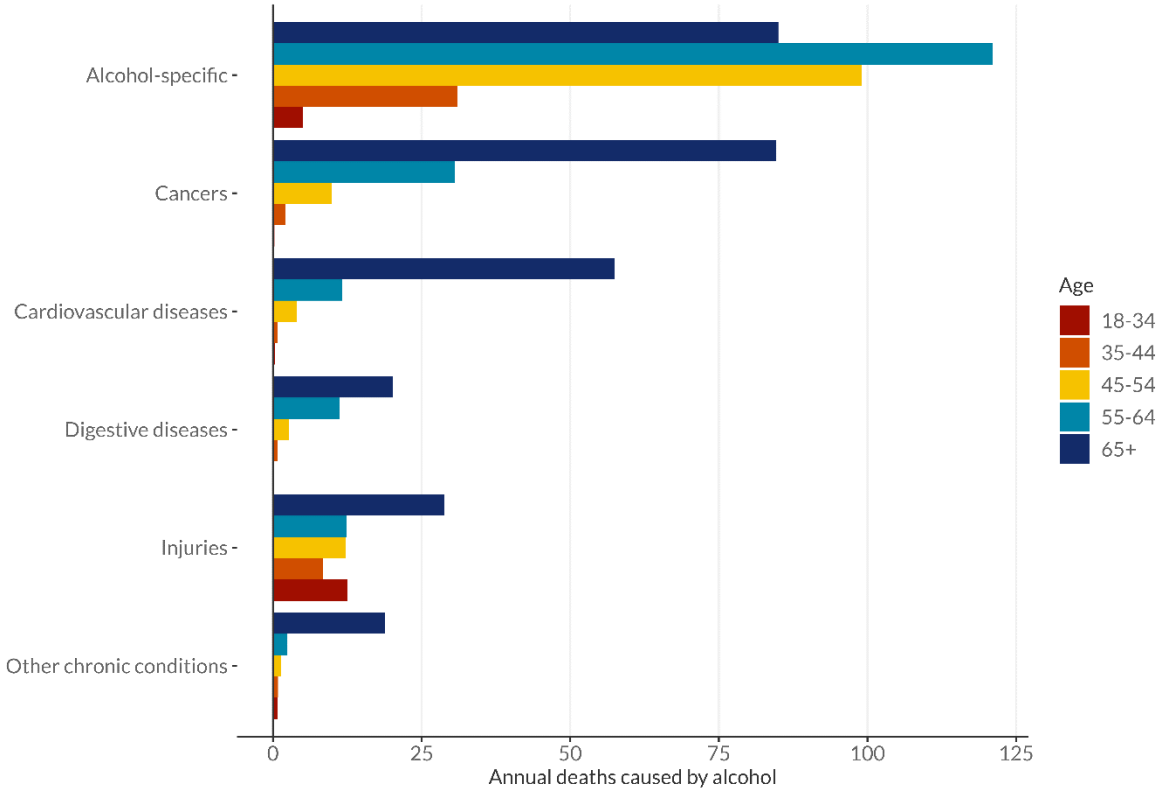
As may be expected, given the markedly higher levels of alcohol consumption among men, men bear the brunt of the mortality impacts of alcohol consumption, suffering 69.7% of all alcohol-attributable deaths.

Figure 6: Estimated annual deaths due to alcohol by sex



Breaking the figures down by age, as shown in Figure 7 demonstrates that for most causes, it is the oldest age group that suffers the biggest mortality impacts from alcohol, with 43.6% of alcohol-attributable deaths occurring in the over 65s. It is notable, however, that deaths from alcohol-specific causes are higher in 45-54 and 55-64 year olds. The burden of alcohol-attributable injury deaths is also felt more substantially in younger age groups.

Figure 7: Estimated annual deaths due to alcohol by age



Hospital admissions caused by alcohol

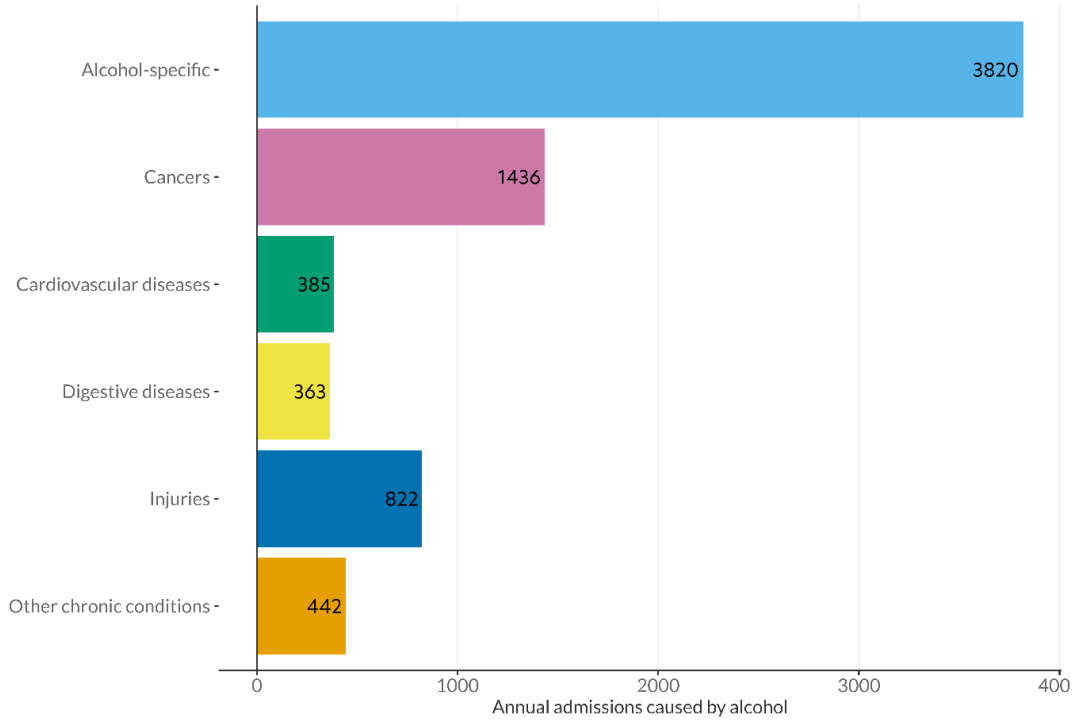
The estimated number of annual inpatient hospital admissions in Northern Ireland caused by alcohol is shown in Table 2 and visualised by cause group in Figure 8. Each year an estimated 7,426 admissions to hospital are caused directly be alcohol consumption.

Table 2: Estimated annual alcohol-attributable hospital admissions in Northern Ireland

		Sex		Age					
	Population	Female	Male	0-17	18-34	35-44	45-54	55-64	65+
Alcohol-specific	3,871	1,116	2,754	51	474	810	960	976	600
Cancers	1,438	660	777	2	29	118	295	518	476
Cardiovascular diseases	387	71	317	3	13	26	48	102	195
Digestive diseases	364	78	286	1	25	51	61	116	109
Injuries	881	206	676	59	175	108	133	152	255
Other chronic conditions	484	120	365	42	40	32	41	82	247
Total	7,426	2,251	5,174	158	756	1,144	1,539	1,947	1,882

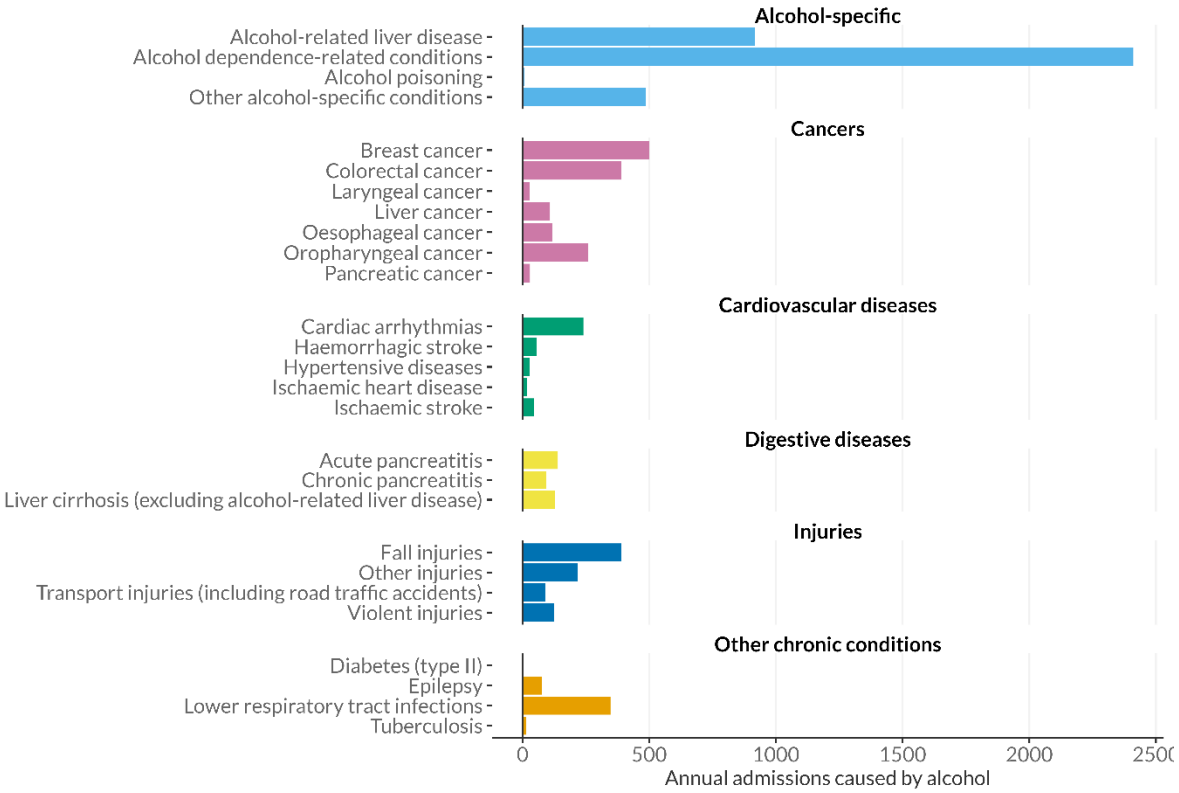
As for mortality, alcohol-specific causes make up the biggest single group of alcohol-attributable admissions, accounting for 52.1% of the total. Alcohol-attributable cancer admissions are the second largest contributor, accounting for almost one in 5 alcohol-attributable admissions (19.4%).

Figure 8: Estimated annual hospital admissions due to alcohol by condition group



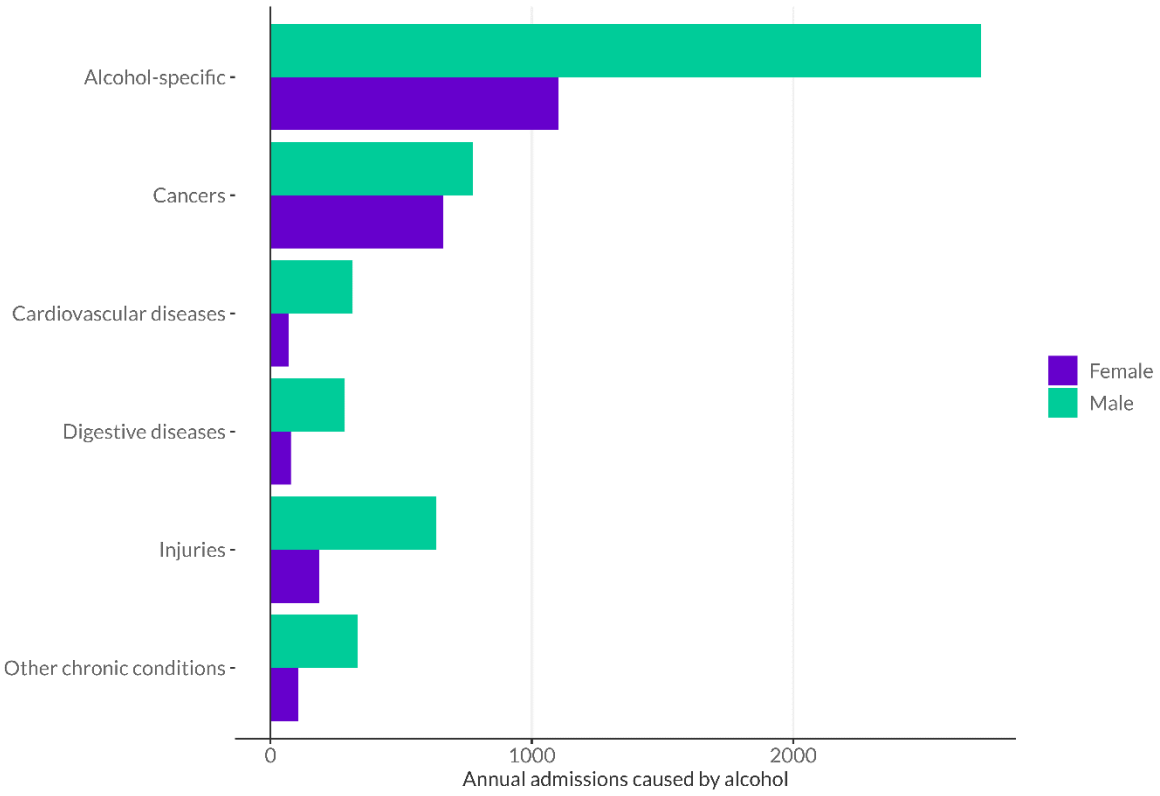
Separating these figures out by specific cause, in Figure 9 and Table S3, shows broadly similar patterns to the alcohol-attributable deaths from Figure 5, but with a few notable differences. Most significantly, admissions related to alcohol dependence are the single largest cause, accounting for a third of all admissions caused by alcohol (33.0%). The relative burden of alcohol on admissions for falls, breast cancer and lower respiratory tract infections (which include bronchitis, pneumonia and some causes of flu) is also substantial, accounting for 501, 416 and 365 admissions per year respectively.

Figure 9: Estimated annual hospital admissions due to alcohol by specific cause



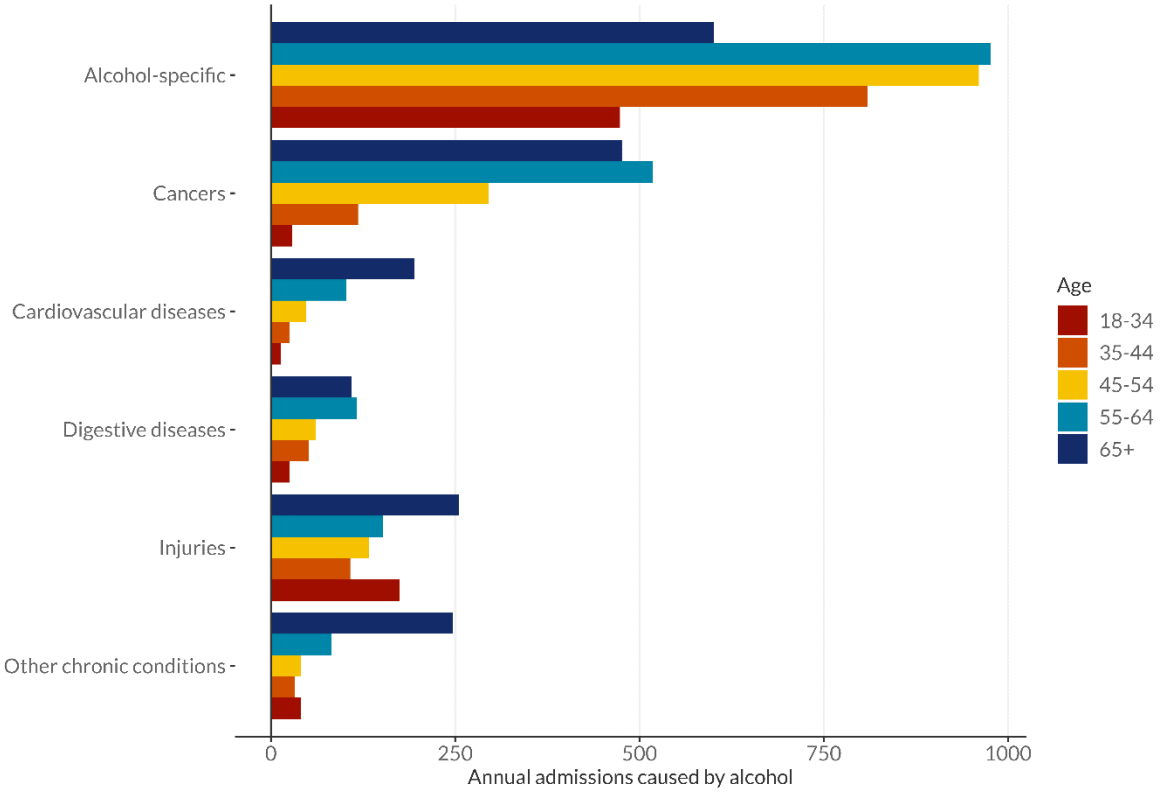
Separating these figures out by sex, as illustrated in Figure 10, shows again the much greater burden of alcohol harms in men. It is, however, striking that the burden of alcohol-attributable admissions for cancer is much more evenly balanced between men and women. This is as a result of the relatively large number (501) of alcohol-attributable breast cancer admissions in women.

Figure 10: Estimated annual hospital admissions due to alcohol by sex



Finally, the number of alcohol-attributable hospital admissions in each age group is shown in Figure 11. Patterns differ across age groups, with the largest numbers of admissions for alcohol-specific conditions in 45-54 and 55-64 year olds, the most admissions for alcohol-attributable cancers in 55-64 year olds and the over 65s and a substantial number of alcohol-attributable admissions due to injuries in 18-34 year olds (175).

Figure 11: Estimated annual hospital admissions due to alcohol by age



The estimated cost of these alcohol-attributable admissions to the NHS in Northern Ireland is shown in Table 3. Each year, admissions directly caused by alcohol cost the health service almost £19million, with alcohol-specific causes (£8.3m) and alcohol-attributable cancers (£4.2m) the biggest contributors. As discussed in the data section of this report, these figures reflect the cost of inpatient admissions only and are therefore likely to be a significant underestimate of the full financial burden of alcohol on the NHS.

Table 3: Estimated annual costs of alcohol-attributable hospital admissions to the NHS

	Annual cost to the NHS
Alcohol-specific	£8,322,341
Cancers	£4,178,288
Cardiovascular diseases	£1,233,219
Digestive diseases	£1,135,551
Injuries	£2,596,392
Other chronic conditions	£1,496,569
Total	£18,962,361

Finally, given that alcohol risk increases as alcohol consumption increases, we explored the extent to which alcohol harms are concentrated in the heaviest drinkers. The results of this analysis are presented in Table 4. These show that very little alcohol harm, either admissions or deaths, occurs to the lightest drinking half of drinkers (note that the 24.9% of adults in Northern Ireland who do not drink alcohol are excluded from these figures). Approximately three-quarters of drinkers in Northern Ireland drink within the Chief Medical Officers' low risk drinking guidelines of 14 units per week. People drinking within these levels experience between a fifth and a quarter of all alcohol harms, in spite of representing the large majority of the population. Harms are instead concentrated in the heaviest drinkers, with the 25% of drinkers who exceed the guidelines being responsible for 80% of all hospital admissions and 78% of all deaths caused by alcohol. Over half of all alcohol harms are concentrated in the 10% of drinkers who drink at the highest levels.

Table 4: Estimated concentration of alcohol harms by drinker group

	Proportion of admissions caused by alcohol	Proportion of deaths caused by alcohol
Lightest drinking 25% of drinkers	0.01%	0.01%
Lightest drinking 50% of drinkers	1.13%	1.31%
Lightest drinking 75% of drinkers	20.11%	22.36%
The heaviest drinking 10% of drinkers	53.15%	51.77%
The heaviest drinking 5% of drinkers	39.18%	38.33%

Summary

The new analysis in this report uses the most recently-available, post-pandemic data on alcohol and health to demonstrate the significant and substantial burden that alcohol places on public health in Northern Ireland. Each year an estimated 7,426 hospital admissions take place as a direct result of alcohol and 676 people sadly lose their lives due to their drinking. This costs the NHS an estimated £19m as well as having a significant impact on wider aspects of society, including police and criminal justice, workplace productivity and public disorder. Reducing this burden will require the implementation of effective alcohol policy options.

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Table S1: Alcohol-Attributable Fractions for mortality for Northern Ireland

Cause	Population	Sex		Age				
		Female	Male	18-34	35-44	45-54	55-64	65+
Cancers								
Oropharyngeal cancer	31.6%	16.1%	42.6%	32.0%	34.2%	34.3%	36.6%	23.0%
Oesophageal cancer	8.6%	7.1%	7.0%	0.9%	11.1%	14.1%	14.6%	8.8%
Colorectal cancer	6.9%	3.6%	10.2%	7.2%	7.3%	8.0%	8.1%	4.8%
Liver cancer	18.2%	6.3%	27.8%	18.7%	22.8%	16.5%	23.1%	12.3%
Pancreatic cancer	2.1%	1.1%	3.1%	2.3%	2.2%	2.5%	2.5%	1.5%
Laryngeal cancer	16.4%	8.5%	23.2%	16.9%	17.3%	18.5%	19.0%	11.5%
Breast cancer	3.2%	6.1%	0.0%	3.8%	3.3%	3.7%	3.2%	2.2%
Cardiovascular diseases								
Hypertensive diseases	9.4%	2.2%	15.8%	10.2%	9.2%	10.8%	10.5%	6.7%
Ischaemic heart disease	1.4%	0.8%	1.9%	1.5%	1.9%	1.1%	1.8%	0.7%
Cardiac arrhythmias	6.3%	3.3%	9.3%	6.6%	6.7%	7.2%	7.4%	4.3%
Haemorrhagic stroke	10.5%	9.6%	11.3%	11.7%	11.1%	11.6%	11.6%	7.1%
Ischaemic stroke	4.3%	5.6%	3.0%	8.2%	5.6%	2.3%	3.0%	0.8%
Digestive diseases								
Liver cirrhosis (excluding alcohol-related liver disease)	65.7%	51.6%	73.6%	65.5%	71.1%	64.5%	72.0%	55.8%
Acute pancreatitis	14.9%	2.9%	24.7%	15.2%	16.3%	16.2%	18.7%	10.2%
Chronic pancreatitis	28.1%	12.9%	39.1%	28.6%	31.9%	28.9%	33.4%	20.0%
Other chronic conditions								
Diabetes (type II)	0.4%	0.0%	0.8%	0.4%	0.4%	0.5%	0.5%	0.3%
Epilepsy	16.2%	8.0%	23.2%	16.7%	17.7%	17.7%	19.1%	11.3%
Tuberculosis	28.0%	12.8%	39.0%	28.5%	31.8%	28.9%	33.3%	20.0%
Lower respiratory tract infections	5.1%	2.7%	7.5%	5.4%	5.4%	5.9%	6.0%	3.5%
Injuries								
Transport injuries (including road traffic accidents)	8.3%	4.5%	12.0%	6.8%	8.4%	10.7%	11.4%	6.4%
Fall injuries	9.0%	4.9%	12.9%	7.4%	9.1%	11.6%	12.3%	7.0%
Violent injuries	26.9%	16.2%	35.5%	23.0%	27.2%	32.7%	34.2%	21.7%
Other injuries	7.4%	4.2%	10.4%	6.1%	7.4%	9.5%	10.0%	5.7%

Table S2: Alcohol-Attributable Fractions for hospital admissions in Northern Ireland

Cause	Population	Sex		Age				
		Female	Male	18-34	35-44	45-54	55-64	65+
Cancers								
Oropharyngeal cancer	31.6%	16.1%	42.6%	32.0%	34.2%	34.3%	36.6%	23.0%
Oesophageal cancer	8.6%	7.1%	7.0%	0.9%	11.1%	14.1%	14.6%	8.8%
Colorectal cancer	6.9%	3.6%	10.2%	7.2%	7.3%	8.0%	8.1%	4.8%
Liver cancer	18.2%	6.3%	27.8%	18.7%	22.8%	16.5%	23.1%	12.3%
Pancreatic cancer	2.1%	1.1%	3.1%	2.3%	2.2%	2.5%	2.5%	1.5%
Laryngeal cancer	16.4%	8.5%	23.2%	16.9%	17.3%	18.5%	19.0%	11.5%
Breast cancer	3.2%	6.1%	0.0%	3.8%	3.3%	3.7%	3.2%	2.2%
Cardiovascular diseases								
Hypertensive diseases	9.4%	2.2%	15.8%	10.2%	9.2%	10.8%	10.5%	6.7%
Ischaemic heart disease	1.6%	3.1%	0.0%	3.7%	2.7%	0.2%	0.5%	0.1%
Cardiac arrhythmias	6.3%	3.3%	9.3%	6.6%	6.7%	7.2%	7.4%	4.3%
Haemorrhagic stroke	7.3%	1.3%	12.9%	7.8%	8.0%	8.1%	8.8%	4.8%
Ischaemic stroke	1.5%	0.6%	2.5%	1.6%	1.9%	1.6%	2.0%	0.9%
Digestive diseases								
Liver cirrhosis (excluding alcohol-related liver disease)	36.5%	36.7%	35.6%	37.3%	39.0%	38.9%	40.0%	27.6%
Acute pancreatitis	14.9%	2.9%	24.7%	15.2%	16.3%	16.2%	18.7%	10.2%
Chronic pancreatitis	28.1%	12.9%	39.1%	28.6%	31.9%	28.9%	33.4%	20.0%
Other chronic conditions								
Diabetes (type II)	0.4%	0.0%	0.8%	0.4%	0.4%	0.5%	0.5%	0.3%
Epilepsy	16.2%	8.0%	23.2%	16.7%	17.7%	17.7%	19.1%	11.3%
Tuberculosis	28.0%	12.8%	39.0%	28.5%	31.8%	28.9%	33.3%	20.0%
Lower respiratory tract infections	5.1%	2.7%	7.5%	5.4%	5.4%	5.9%	6.0%	3.5%
Injuries								
Transport injuries (including road traffic accidents)	8.3%	4.5%	12.0%	6.8%	8.4%	10.7%	11.4%	6.4%
Fall injuries	9.0%	4.9%	12.9%	7.4%	9.1%	11.6%	12.3%	7.0%
Violent injuries	26.9%	16.2%	35.5%	23.0%	27.2%	32.7%	34.2%	21.7%
Other injuries	7.4%	4.2%	10.4%	6.1%	7.4%	9.5%	10.0%	5.7%

Table S3: Estimated deaths and hospital admissions caused by alcohol by cause

	Admissions due to alcohol	Deaths due by alcohol
Alcohol-specific		
Alcohol-related liver disease	917	248
Alcohol dependence-related conditions	2,451	55
Alcohol poisoning	6	18
Other alcohol-specific conditions	496	20
Cancers		
Breast cancer	501	15
Colorectal cancer	390	29
Laryngeal cancer	28	7
Liver cancer	110	29
Oesophageal cancer	119	15
Oropharyngeal cancer	260	29
Pancreatic cancer	29	4
Cardiovascular diseases		
Cardiac arrhythmias	241	12
Haemorrhagic stroke	56	20
Hypertensive diseases	30	20
Ischaemic heart disease	16	17
Ischaemic stroke	44	5
Digestive diseases		
Acute pancreatitis	141	7
Chronic pancreatitis	95	2
Liver cirrhosis (excluding alcohol-related liver disease)	128	26
Injuries		
Fall injuries	416	30
Other injuries	239	37
Transport injuries (including road traffic accidents)	97	5
Violent injuries	129	2
Other chronic conditions		
Diabetes (type II)	3	1
Epilepsy	100	4
Lower respiratory tract infections	365	19
Tuberculosis	16	1