The health impacts of alcohol

Physical and mental health effects • Accidents and injuries • How alcohol mortality rates are calculated in the UK • Alcohol-related mortality rates • Alcohol-related morbidity rates
According to the World Health Organisation (WHO), the harmful use of alcohol results in 3.3 million deaths every year, representing 5.9% of all deaths, and it is a causal factor in more than 200 disease and injury conditions. Overall 5.1% of the global burden of disease and injury is attributable to alcohol, as measured in disability-adjusted life years (DALYs).

Alcohol consumption causes death and disability relatively early in life. In the age group 20 – 39 years approximately 25% of the total deaths are alcohol-attributable. There are gender differences in alcohol-related mortality, morbidity, as well as levels and patterns of alcohol consumption. The percentage of alcohol-attributable deaths among men amount to 7.6% of all global deaths compared to 4.0% of all deaths among women.

There is a causal relationship between harmful use of alcohol and a range of mental and behavioural disorders, other noncommunicable conditions such as cancer and heart disease, as well as injuries. There is also evidence to indicate causal relationships between harmful drinking and the incidence of infectious diseases such as tuberculosis as well as the course of HIV/AIDS.

The impact of alcohol consumption on chronic and acute health outcomes in populations is largely determined by two separate but related dimensions of drinking: 1) the total volume of alcohol consumed; and 2) the pattern of drinking. There is evidence that a nation’s alcohol consumption directly impacts on the health of its citizens; for example, the European Comparative Alcohol Study has found that for all European Union (EU) countries, any rise or fall in alcohol consumption runs parallel to the harm caused by it.¹

This especially applies to the UK, where deaths from liver cirrhosis (largely caused by alcohol) increased – as did consumption levels – between 1987 and 2001.² Sir Harry Burns, Scotland’s Chief Medical Officer in 2011, noted that mortality from alcoholic liver disease in the country became the highest in Western Europe during that period.³

A variety of factors have been identified at the individual and the societal level, which affect the levels and patterns of alcohol consumption and the magnitude of alcohol-related problems in populations. Environmental factors include the affordability, availability and promotion of alcohol, economic development, culture and the comprehensiveness and levels of implementation and enforcement of alcohol policies.

This factsheet provides an overview of how alcohol effects individuals’ health and also the population levels of alcohol related morbidity and mortality in the UK.

Based on The World Health Organisation ‘Alcohol’ webpage, except where stated (see below).

Physical and mental health effects

Alcohol affects health in a variety of ways; virtually every system of the human body can be damaged by its harmful consumption. Alcohol is associated with more than 60 adverse health consequences and hundreds of physical and mental conditions.

Alcohol is metabolised in the body using 2 processes:

1. Oxidation: body cells combine oxygen with dissolved food in the bloodstream, leading to the release of heat and energy (calories) to be used for cell maintenance and repair. Alcohol calories are burnt immediately. Oxidation deals with over 90% of alcohol consumed.
2. Elimination: between 2 and 10% of alcohol consumed escapes unused via breath, urine or sweat glands.

For all types of alcohol-related harm, risk increases the more an individual drinks. The effects of excessive alcohol consumption on the mind and body are illustrated in figure 1.

**Figure 1: Effects of high-risk drinking**

![Figure 1: Effects of high-risk drinking](image)

**Brain:** As a depressant of the central nervous system, alcohol interferes with the brain’s communication pathways. This occurs by the penetration of the blood-brain barrier, which otherwise prevents or slows the passage of some drugs and other harmful substances from the blood into the central nervous system. These disruptions can change mood and behaviour, and make it harder to think clearly and move with coordination. The degree to which brain activity slows down depends on how much, and how fast, a person drinks.

Some effects people experience include: altered speech; hazy thinking; slowed reaction time; dulled hearing; impaired vision; weakened muscles; and foggy memory.

In the long run, the effects of alcohol on the brain can be both psychological (mental health problems) and physiological (damage to brain tissue). People who drink heavily are particularly vulnerable, and alcohol is an influential factor in a number of conditions, including anxiety and depression, psychotic disorders, and suicide. For instance, it is common for people who have a mental health problem such as anxiety, depression, or schizophrenia, to ‘self-medicate’ the distressing symptoms of their condition using alcohol.²

Alcohol dependence also delays recovery from co-existing psychiatric conditions.³ One answer to a parliamentary question revealed that in 2012/13, there were roughly 23,000 alcohol treatment clients receiving care from mental health services for reasons other than substance misuse in England.⁴ The risk of dependence jumps dramatically for men who exceed 7/8 drinks per occasion, for women 5/6 drinks per occasion (i.e. binge drinking levels).⁵ Heavy steady chronic drinking at sufficiently high levels can also lead to the physiological changes that result in alcohol dependence.⁶

In addition, researchers who have tried to elucidate the relationship between alcohol consumption and aggression have suggested that people with a psychiatric condition called antisocial personality disorder (ASPD) may be particularly susceptible to alcohol-related aggression. One US survey of over 20,000 people found that those who met the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders criteria for ASPD (DSM-IV) were 21 times more likely to develop alcohol abuse and dependence at some point during their lives than those who did not have ASPD.⁷

Over a long period of time, however, heavy drinkers may also develop various types of physical brain damage; chronic alcohol dependence is associated with extensive brain damage and cognitive deficits leading in extreme cases to conditions such as alcoholic dementia, a loss of intellectual functioning combined with amnesia. Post-mortem studies have suggested that Wernicke-Korsakoff syndrome – one such form of alcohol-related dementia associated with alcohol misuse – occurs in about 2% of the general population and 12.5% of dependent drinkers.⁸

These are due in part to the toxic effects of alcohol itself, but long term alcohol misuse can also lead to vitamin deficiencies that exacerbate the damage.⁹ Alcohol-induced brain damage can be partially reversible if identified and treated in time.¹⁰

Heart: The impact of alcohol on the heart has long been debated in the scientific literature, with recent expert opinion increasingly supporting the view that the benefits for heart health of drinking alcohol are less and apply to a smaller group of the population than previously thought. This conclusion was reached in the Chief Medical Officers’ 2016 report of the UK’s alcohol consumption guidelines. Expert evidence provided for the paper showed that the only group with potential to have an overall significant reduction in risk of death in the UK is women over the age of 55 (especially if drinking around 5 units a week or less), but that heart disease was a significant risk factor for heavy drinking in the short-term and regular drinking in the long-term.¹¹

A meta-analysis of evidence from more than 50 studies that linked drinking habits and cardiovascular health for over 260,000 people found that “reducing the amount of alcoholic beverages consumed, even for light-to-moderate drinkers, may improve cardiovascular health, including a reduced risk of coronary heart disease”.¹² This has since been followed by an international review of nearly 4 million respondents from 87 studies, which has shown
that previous research “over-estimated the possible health benefits of alcohol and under-estimated its health risks”.¹³

Whether consumed as wine, beer, or spirits, the alcohol content remains the same; a glass of wine, 250ml of ordinary strength beer and a single measure of spirits are all equal in their impact on health.¹⁴ Therefore, large quantities of alcohol – regardless of beverage type – can affect how the heart works, and in turn, the rest of the body, for if the heart isn't pumping blood throughout the body effectively, other organs may suffer from lack of oxygen or nutrients.¹⁵

The pattern of consumption can also have an adverse effect on the organ's function. Heavy consumption either during a single occasion or over a long period can cause and aggravate heart conditions such as cardiomyopathy (stretching and drooping of heart muscle) and arrhythmias (irregular heart beat), and may also lead to strokes and high blood pressure.

**Liver:** The liver is the major detoxifying organ of the body; it is responsible for processing what we eat and drink into nutrients and energy, as well as removing harmful substances from the blood. Most of the alcohol a person drinks is eventually broken down by the liver.

As the body cannot store alcohol, it is treated as a potential poison and eliminated via the liver, which makes it particularly vulnerable to the harmful effects of alcohol. Hence, alcoholic liver disease is the most likely type of physiological condition to result from persistent or chronic heavy alcohol consumption. The most recent official figures found alcoholic liver disease to be responsible for the majority of alcohol-related deaths in England and Wales.¹⁶

The alcohol that is absorbed from the stomach and small intestine enters the portal vein that leads directly to the liver. The liver then effectively removes alcohol from the body by changing it to other compounds. However, too much alcohol can fast overwhelm your liver's capacity to metabolise, and consequently your blood alcohol level rises.

Some liver damage comes from free radicals, a group of molecules that are highly reactive. These molecules can attack the nearest stable molecule, leading to a dangerous chain reaction that can result in a disease called cirrhosis of the liver. Cirrhosis occurs when scar tissue replaces normal, healthy tissue and the liver, which needs unrestricted blood flow, doesn't work as it should.¹⁷

The body's natural defenses against free radicals (e.g., antioxidants) can be inhibited by alcohol consumption, leading to increased liver damage.¹⁸ Heavy drinking over a period of years can damage the liver, causing inflammations such as steatosis (fatty liver) alcoholic hepatitis, and fibrosis. A number of studies support a “small” causal relationship between consumption and risk of developing liver cancer.¹⁹

**Digestive and endocrine systems:** Alcohol is not digested like other foods; it avoids the normal digestive process and goes straight into the bloodstream. About 20% of the alcohol consumed is absorbed in the stomach, and about 80% is absorbed in the small intestine. Alcohol increases acid in the stomach, which in alcohol abusers can lead to severe stomach pain or sores in the intestines. One way to help prevent the increase of acid is by eating while drinking, as food slows down the rate at which alcohol is absorbed by the body.²⁰
The action of hormone release is complex. Hormones must be released at the right time, to the right tissues in the body. Alcohol can impair both the functions of the glands that release hormones and the tissues to which they are being sent. Drinking heavily can cause a steep rise in blood sugar, to which the pancreas responds by producing insulin to lower the blood sugar. But if it rises too steeply, the resulting overproduction of insulin can actually lead to low blood sugar, a condition called hypoglycemia. This is especially dangerous for diabetics, especially those taking certain drugs to lower their blood sugar.

Alcohol also affects the endocrine system by interfering with how the body absorbs calcium, a chemical necessary for bone strength. As a result, people who drink heavily may be at a higher risk for osteoporosis, a disease in which bone density declines. If bones aren’t strong, there is a greater possibility of fractures.

**Immune system and impaired sensations:** From having frequent colds to numbness, heavy or hazardous drinking on a single occasion slows your body’s ability to ward off infections, even up to 24 hours after getting drunk. Over time, chronic drinkers are more liable to contract diseases like pneumonia and tuberculosis than those who do not drink above the recommended guidelines.

Men or boys who drink large amounts of alcohol can experience a loss of testosterone, the hormone that regulates male sexual function and semen. As a result, they could experience erectile dysfunction and emotional changes.

Some women find that they are more affected by alcohol while ovulating or when they are premenstrual. This is because it takes alcohol longer to be metabolised, leading to a higher blood alcohol concentration. Women using oral contraceptives may not become intoxicated as quickly as they would otherwise, because of the contraceptive’s ability to delay the absorption of alcohol into the bloodstream.

Heavy drinking is already known to be a possible cause of infertility, but a Danish study found that even small amounts of alcohol can affect fertility.²¹

**Foetal Alcohol Syndrome:** Exposure to alcohol can affect pregnant women too. Fetal Alcohol Syndrome is a term commonly used to describe the range of effects that can occur in an individual who was exposed to alcohol during pregnancy.

By crossing the placental barrier, alcohol can affect a foetus by stunting its growth or weight, creating distinctive facial stigmata, and damaging the structure of the central nervous system in development. This can result in psychological or behavioural problems at birth, and physical symptoms such as an abnormally small head, defective development of mid facial tissues, minor outer ear abnormalities, abnormally small eyes, and heart and genital defects.

**Cancers:** The International Agency for Research into Cancer (IARC) has classified alcohol as a Group 1 carcinogen since 1988, Group 1 being the highest risk category. This means that there is convincing evidence that alcohol causes cancer.²²

Alcohol consumption may give rise to malignant tumours via the toxic metabolite acetaldehyde, which is mutagenic and can cause cancer by damaging DNA and preventing it from being repaired.²³ Drinking alcohol greatly increases the level of acetaldehyde found
in saliva. A small initial study published in 2012 found higher levels of DNA damage in the mouth cells of people after drinking alcohol. The 2010 IARC Monograph concluded that alcohol is causally linked (to varying degrees) to several cancers – especially those of the oral cavity, pharynx (upper throat), larynx (voice box), oesophagus, breast, and colorectum – and that, in many cases, the risk of cancer increases in a dose-dependent manner, i.e. risk increases with the volume consumed. All types of alcoholic drinks, including wine, beer and spirits, can increase the risk of cancer. The risk is linked to the actual alcohol (ethanol) in the drink.

A study published in 2011 found that alcohol is responsible for about 4% of UK cancers, about 12,500 cases per year.

1 Anderson P (2003), 'The Risk of Alcohol', PhD Thesis, Nijmegen University; The Netherlands
2 Mental Health Foundation (October 2010), 'Alcohol and Mental Health', pp. 1–2
4 House of Commons Debates (November 2013), 'Mental Illness: Drugs and Alcoholic Drinks', c1078W
5 NIAAA (2002), 'Alcohol consumption and problems in the general population: Findings from the 1992 National Longitudinal Alcohol Epidemiologic Survey'
6 The ICAP Blue Book, 'Module 17: Alcohol dependence and Treatment', p. 17.3
9 Alcohol Concern (March 2014), 'All in the mind – Meeting the challenge of alcohol-related brain damage', p. 5 <http://www.alcoholconcern.org.uk/publications/policy-reports/all-in-the-mind>
10 Knight RG, 'Neurological Consequences of Alcohol Use', Chapter 7 in International Handbook of Alcohol Dependence and Problems, pp. 129–149
11 Department of Health (January 2016), 'UK Chief Medical Officers’ Alcohol Guidelines Review: Summary of the proposed new guidelines', pp. 3–5
12 Institute of Alcohol Studies (July 2014), 'New study shows drinking alcohol, even light-to-moderate amounts, provides no heart health benefit' <http://tinyurl.com/zmd2ffm>
13 Anderson, 'The Risk of Alcohol'
15 Office for National Statistics (February 2014), 'Liver disease biggest cause of alcohol-related deaths in England and Wales' <http://tinyurl.com/jn2ek2>
16 Science NetLinks, 'Digestive system'
19 Science NetLinks, 'Digestive system'
22 Bofetta P, and Hashibe M, 'Alcohol and Cancer', Lancet Oncology (February 2006), Volume 7: Issue 2, pp. 149–156


Accidents and injuries

Alcohol-related health harm is not just limited to chronic disease or physical illness. The presence of alcohol in the body has also been shown to increase the severity of injuries from accidents.¹

Alcohol has a range of psycho-motor and cognitive effects that increase accident risk on reaction times, cognitive processing, coordination, vigilance, vision and hearing, even at low blood alcohol levels. For these reasons alcohol consumption is normally closely regulated in relation to the operation of transport systems and other safety sensitive environments and activities. The British Medical Association (BMA) Guide to Alcohol & Accidents comprises a list of the symptoms of alcohol consumption at various levels (see figure 2).

Figure 2: Alcohol as a cause of accidents

<table>
<thead>
<tr>
<th>ALCOHOL AS A CAUSE OF ACCIDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood alcohol concentration (BAC) is measured as the number of milligrams of ethanol in every 100 millilitres of blood. This is denoted as mg/100 ml (mp alc).</td>
</tr>
<tr>
<td><strong>ALCOHOL IMPAIRMENT</strong></td>
</tr>
<tr>
<td>Effects on central nervous system</td>
</tr>
<tr>
<td>At BACs of 30 mg/ml impairment begins in:</td>
</tr>
<tr>
<td>- Cognitive function</td>
</tr>
<tr>
<td>- Motor coordination</td>
</tr>
<tr>
<td>- Sensory perception</td>
</tr>
<tr>
<td>BACs of 50 mg/ml may lead to changes of mood and behaviour, particularly euphoria.</td>
</tr>
<tr>
<td>With increasing intoxication the following occur:</td>
</tr>
<tr>
<td>- Slurred speech</td>
</tr>
<tr>
<td>- Unsteadiness</td>
</tr>
<tr>
<td>- Impaired reasoning and memory</td>
</tr>
<tr>
<td>- Impaired vision</td>
</tr>
<tr>
<td>- Decreased concentration</td>
</tr>
<tr>
<td>Effects on performance</td>
</tr>
<tr>
<td>At BACs of 30 mg/ml impairment begins in:</td>
</tr>
<tr>
<td>- Focusing and ability to follow objects with eyes</td>
</tr>
<tr>
<td>- Breadth of visual fields</td>
</tr>
<tr>
<td>- Ability to discriminate between lights of different intensity</td>
</tr>
<tr>
<td>- Discrimination of sounds</td>
</tr>
<tr>
<td>- Reaction time</td>
</tr>
<tr>
<td>- Performance on standard intellectual tests</td>
</tr>
</tbody>
</table>

Adverse effects on vision have been found at blood alcohol concentrations of 30mg ethanol per 100ml blood, and the psychomotor skills required for driving have been found to show impairment from 40mg/100ml (in the UK the legal blood alcohol limit for drivers is 80mg/100ml). Raised risk of accident can also remain for some time after drinking, as skills and faculties do not necessarily return to normal immediately even once all alcohol has left the body. Drink-driving vehicles in general is a dangerous activity, as the number of alcohol-related serious injuries and deaths on Great Britain’s roads demonstrates. Accidents and casualties caused by drink-driving accounted for around 14% of road deaths and 5% of killed or seriously injured (KSI) casualties in 2014.²

Impairment of faculties can also have a dangerous effect on the control of aircraft. In a study of airline pilots who had to perform routine tasks in a simulator under 3 alcohol test conditions, it was found that:
• before the ingestion of any alcohol, 10% of them could not perform all the operations correctly;
• after reaching a blood alcohol concentration of 100mg/dl, 89% could not perform all the operations correctly;
• and 14 hours later, after all the alcohol had left their systems, 68% still could not perform all the operations correctly.  

A 2009 parliamentary paper recognised alcohol as a contributory factor in accidents on the road, at home and in the workplace, as well as being strongly linked with acts of violence and social disorder. A national survey of most of the UK's Emergency Departments found that 70% of night time attendances and 40% of daytime attendances were caused by alcohol.  

Alcohol is the biggest single cause of accidents in the home. Every year, there are around 4,000 fatal domestic accidents, 2.6 million accidents that require treatment in A&E departments and many more accidents not accounted for in the hospital admissions statistics. Alcohol-related accidents can often have fatal outcomes. In 2008, the London Fire Brigade estimated that almost a third of accidental fire deaths in the capital were alcohol-related. At a conservative estimate, it is believed that a total of 400 people die in alcohol-related home accidents every year. 

Alcohol's ability to increase the risk of danger extends beyond the home. According to Alcoholics Anonymous, a quarter of accidents at work are drink-related.  

Alcohol consumption – and in particular, binge-drinking – increases the risk of being a victim of violence, usually through decreased physical capacity, compromised decision-making and isolation in unsuitable settings. In England and Wales, it is estimated that alcohol is associated with 15 – 25% of all suicides and 65% of all suicide attempts. In Scotland, 53% of people committing suicide who had contact with mental health services in the 12 months prior to death had a history of alcohol misuse. It also increases the likelihood of perpetrating violence through reduced inhibition and increased aggression. 1.2 million violent incidents (around half of all violent crimes) and 360,000 incidents of domestic violence (around a third) are linked to alcohol misuse, and an estimated 19,000 alcohol-related sexual assaults occur each year in England and Wales.  

A significant proportion of avoidable deaths and hospital admissions each year are particularly attributable to the alcohol consumption of young people. A government white paper on public health published in 2010 emphasised the danger of alcohol misuse to young people's lives, stating that accidents due to alcohol (including drink-driving accidents) are the leading cause of death among 16–24 year-olds.

1 Fuller MG, 'Alcohol use and injury severity in trauma patients', Journal of Addictive Diseases (1995), 14, pp. 47–54  
2 Government (August 2016), 'Reported road casualties in Great Britain, estimates involving illegal alcohol levels: 2015', Department for Transport, Statistical Release  
4 House of Commons Health Committee (2009), 'Alcohol: First Report' <http://www.publications.parliament.uk/pa/cm200910/cmselect/cmhealth/151/15102.htm#_blank>  
5 London Fire Brigade (2008), 'Almost a third of accidental fire deaths in London are alcohol-related'; 'The fire dangers of alcohol', <http://www.london-fire.gov.uk/featureFireRiskAndAlcohol.asp>  
6 Consumer & Competition Policy Directorate (2002), 'Research on the proportion of home accidents involving product fault or contributory behaviour', p. 28  
How alcohol mortality and morbidity rates are calculated in the UK

Within the United Kingdom, data on alcohol-related mortality and morbidity are compiled by the health statistics divisions of separate agencies for England, Wales, Scotland, and Northern Ireland. The Office of National Statistics (ONS) holds data on alcohol mortality and morbidity rates for England and Wales, as do the Information Services Division (ISD) for Scotland and the Northern Ireland Statistics and Research Agency (NISRA) for Northern Ireland.

All national health statistics compiled on alcohol-related causes of death or admissions to hospitals follow the World Health Organisation (WHO) International Statistical Classification of Diseases and Related Health Problems. The most recent system of categorisation – the 10th revision – was endorsed by the 43rd World Health Assembly in May 1990 and came into use in WHO Member States from 1994.1

All rates are also standardised according to the European Age Standardised Rate (EASR). The ISD defines this as follows:

**Standardised rates are used to allow comparisons across geographical areas by controlling for differences in the age structure of local populations. Age standardised rates can be compared across areas and time periods. They give the number of events that would occur in a standard population (per 100,000) if that population had the age-specific rates of a given area. The rates are standardised to the European Standard Population (ESP). The age groups used for deriving the standardised rates are as defined in the ESP**.2

**Alcohol-related mortality rates**

In the UK, alcohol-related mortality is estimated according to ‘specific’ or ‘underlying’, and ‘contributory’ factors. The ONS uses the former in its calculations.

Underlying factors are defined as either the disease or injury which initiated the train of morbid events leading directly to death; or the circumstances of the accident or violence which produced the fatal injury.3 However, these exclude deaths where an alcohol-related condition was recorded as a contributory factor; a contributory cause of death is a significant condition that contributes to the fatal outcome, i.e. where an alcohol-related condition is mentioned as an additional element to a fatal outcome by other means.

A broader definition of an alcohol-related death includes both underlying and contributory causes. Mortality statistics under the title ‘any mention’ combine these factors.

The ONS definition of alcohol-related deaths only includes those causes regarded as being most directly due to alcohol consumption (e.g. all deaths from chronic liver disease and cirrhosis, excluding biliary cirrhosis), even when alcohol is not specifically mentioned on the death certificate. It does not include other diseases where alcohol has been shown to have some causal relationship, such as cancers of the mouth, oesophagus and liver. Apart from deaths due to poisoning with alcohol (accidental, intentional or undetermined), this definition also excludes any other external causes of death, such as road traffic and other accidents.4
Alcohol-related morbidity rates

The number of alcohol-related hospital admissions in England is based on the methodology devised by the Centre for Public Health (CPH, then known as the North West Public Health Observatory), which uses indicators for alcohol-related illnesses to determine what proportion of cases of a health condition are alcohol-related. These are known as alcohol-attributable fractions (AAFs).

AAFs were calculated for 47 conditions where a causal relationship with alcohol consumption has been established, of which 13 were by definition directly or wholly attributable to alcohol consumption (AAF = 1) and 34 were partially attributable to alcohol consumption (0 < AAF < 1). Local Alcohol Profiles England (LAPE) provides the full list of conditions attributable to alcohol-related deaths and illnesses/injuries, along with their AAFs, based on the ICD-10 codes.

For each episode of care in hospital, clinicians record the primary diagnosis and up to 19 secondary diagnoses. Where an episode involves more than one alcohol-related diagnosis, the highest AAF within the record is used as the estimate of the overall alcohol-attributable fraction for that episode. The primary diagnosis is defined in the NHS Data Dictionary as “the main condition treated or investigated during the relevant episode of healthcare, and where there is no definitive diagnosis, the main symptom, abnormal findings or problem”. All subsequent conditions discovered in the patient during their episode are recorded as secondary.

Where there are two or more codes with the maximum attributable fraction, the code from the earliest position is used. This method is employed to avoid double counting of the

---

1 Information on patients’ characteristics and diagnoses from the Hospital Episode Statistics (HES)
admission episodes related to alcohol and therefore each episode contributes to one cell in the table. The total number of alcohol-related admissions is arrived at by summing up the number of episodes counted against each alcohol-related condition.**7

Clinicians in Wales calculate the number of alcohol-related admissions based on the CPH method of AAFs from a set of 14 diagnoses (1 primary plus 13 secondary). Both the Health & Social Care Information Centre (HSCIC) in England and the Public Health Wales Observatory (PHWO) use these methods to produce two separate figures on alcohol-related hospital admissions:

- A broad measure, which is derived by summing the AAF associated with each admission based on the diagnosis most strongly associated with alcohol out of all diagnoses (both primary and secondary)
- A narrow measure, which is constructed in a similar way but counts only the fraction associated with the diagnosis in the primary position

Scottish statistics on alcohol morbidity rates are produced differently, on two counts. Firstly, the registration of alcohol-related hospital episodes is derived from a list of 26 conditions based on the ICD-10 coding system.8 Secondly, for each episode of care in hospital, clinicians record the primary diagnosis and up to 5 supplementary diagnoses on discharge, based on recording ICD-10 codes "directly attributable to alcohol".9

A further distinction between the English and Scottish counting methods is that the information presented on General Acute and Psychiatric inpatient and day case hospital stays relates to the time of discharge rather than admission. The reason for this is that as "diagnostic information usually becomes available during the course of a hospital stay, the use of discharge data provides a more complete and accurate picture of a patient’s condition(s)".10

NISRA’s calculations of alcohol-related morbidity rates follows the Scottish method.11

In 2008, a CPH (formerly NWPHO) report identified limitations in the methods used to calculate mortality and morbidity rates. For instance, the over-reliance on the accuracy of population estimates of alcohol consumption, deemed to have “a degree of uncertainty” in their formulation. A further limitation of the methodology noted the application of AAFs to hospital admissions, which required the assumption that the admission profile for an alcohol-related admission for a partially attributable condition is the same as the admission profile for a non-alcohol-related admission.12

Another concern is that the data analysed only includes hospital admissions and not presentation to accident and emergency departments (unless they resulted in an admission).13 This suggests that there may be many more casualties resulting from alcohol which never reach the hospital and therefore go unrecorded. The long-term effect of such discrepancies in the methodology is the underestimation of the true impact of alcohol on mortality and morbidity rates.

In 2014, researchers at the Centre for Public Health, Liverpool John Moores University produced updated figures on the number of deaths and hospital admissions in 2010

---

**7 The total number of alcohol-related hospital admissions, as described by the indicators, is not a number of actual people or a number of actual admissions but an estimated number of admissions calculated by adding up all of the fractions we have identified (see infographic: https://publichealthmatters.blog.gov.uk/wp-content/uploads/sites/33/2014/01/ARHA-graphic.png).
occurring as a result of alcohol consumption, which discovered that – if only the harmful consequences are considered – over 21,000 deaths were caused by alcohol consumption, representing 5% of all deaths in England that year. In addition, over 900,000 admissions to hospital were related to the harmful consequences of alcohol use, around 6% of all admission episodes in England in that year. The most recent dataset (for 2014) puts the number of deaths at approximately 23,000 (see ‘Alcohol-related mortality rates’ section).

Lead author of the report Lisa Jones commented: "This data and improvements in the methodology have allowed us to identify the full impact of alcohol on population health in England". As a result, the Department of Health commissioned paper’s findings will underpin future national estimates of the health impact of alcohol.

It also addressed several limitations in the methods used to previously calculate AAFs, one being the potential overestimation of injury risk associated with alcohol use due to the failure to account for drinking context in which alcohol is consumed, and another being the likely underestimation of consumption in the general population.

In a response to a consultation held by the CPH (formerly NWPHO) over the methods used to estimate alcohol-related hospital admissions for England, the IAS recommended that the methodology used to record data on alcohol-related hospital admissions be amended in order to produce a more robust estimate of the burden caused by alcohol that is comparable between regions and over time.

---

1 World Health Organisation (WHO), 'International Classification of Diseases (ICD)' <http://www.who.int/classifications/icd/en/#_blank>
3 Health and Social Care Information Centre (HSCIC) (October 2010), 'HOSPITAL EPISODE STATISTICS: Mortality Data Dictionary', p. 5 <http://digital.nhs.uk/hasdictionary#_blank>
4 Office for National Statistics (ONS) (February 2014), 'Alcohol-related deaths in the United Kingdom, registered in 2012' <http://tinyurl.com/z5g8bf2>
9 ISD Scotland/NHS National Services Scotland, pp. 96–7
10 ISD Scotland/NHS National Services Scotland, p. 40
11 HSC Public Health Agency (April 2011), 'Health Intelligence Briefing: Alcohol use and alcohol-related harm in Northern Ireland', p. 38
14 The Institute of Alcohol Studies (March 2014), 'New Centre for Public Health report updates figures on the impact of alcohol on population health in England' <http://tinyurl.com/zkf4w99>
16 Institute of Alcohol Studies (August 2012), 'IAS response to NWPHO consultation on the methods used to estimate alcohol-related hospital admissions for England' <http://tinyurl.com/h4lcl5r>
### Alcohol-related mortality rates

According to current Office for National Statistics (ONS) figures, there were 8,697 alcohol-related deaths in the UK in 2014, 281 more than the previous year.

#### Figure 4: UK alcohol-related deaths

In **2014**, there were **8,697** alcohol-related deaths registered in the UK, an age-standardised rate of **14.3 deaths per 100,000 population**.

The ratio of deaths by sex is split 35% female : 65% male

![Graph showing ratio of deaths by sex](image)

There were more than three times as many deaths in England as the rest of the UK combined.

![Map showing deaths by country](image)

Source: Office for National Statistics, 'Alcohol Related Deaths in the United Kingdom'

#### Figure 5: What are the main causes of alcohol-related deaths in the UK?

Alcohol-related liver disease was the most common cause of alcohol-related death, accounting for nearly two-thirds of all alcohol-related deaths.

<table>
<thead>
<tr>
<th>ICD-10 category</th>
<th>England</th>
<th>Wales</th>
<th>Scotland</th>
<th>Northern Ireland</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>K70 Alcoholic liver disease</td>
<td>4,333</td>
<td>299</td>
<td>658</td>
<td>150</td>
<td>5,440</td>
</tr>
<tr>
<td>K74 Fibrosis and cirrhosis of the liver (excluding K74.3-K74.5 biliary cirrhosis)</td>
<td>1,520</td>
<td>111</td>
<td>137</td>
<td>22</td>
<td>1,790</td>
</tr>
<tr>
<td>F10 Mental and behavioural disorders due to alcohol</td>
<td>489</td>
<td>19</td>
<td>280</td>
<td>27</td>
<td>815</td>
</tr>
<tr>
<td>X45 Accidental poisoning by and exposure to alcohol</td>
<td>369</td>
<td>23</td>
<td>61</td>
<td>36</td>
<td>489</td>
</tr>
<tr>
<td>X42.6 Alcoholic cardiomyopathy</td>
<td>94</td>
<td>5</td>
<td>9</td>
<td>1</td>
<td>110</td>
</tr>
<tr>
<td>K86.0 Alcoholic induced chronic pancreatitis</td>
<td>11</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>G31.2 Degeneration of nervous system due to alcohol</td>
<td>13</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>K29.2 Alcoholic gastritis</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>K73 Chronic hepatitis - not elsewhere specified</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>X85 Intentional self-poisoning by and exposure to alcohol</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>G52.1 Alcoholic polyneuropathy</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Y15 Poisoning by and exposure to alcohol, undetermined intent</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: ONS
In 2014, people in their fifties and sixties suffered the highest rate of alcohol-related deaths in the UK. Figure 6 shows that the rate was highest among men aged between 55 and 70 years of age, and highest among women aged between 50 and 65 years of age.

According to Office for National Statistics figures, the number and the rate of alcohol-related deaths have almost doubled in the last 20 years, reaching a peak of 9,031 deaths (15.8 per 100,000 persons) in 2008 (figure 7).
It is important to note that in the case of England, Local Alcohol Profiles England (LAPE) estimated that based on the calculations used by researchers at the Liverpool John Moores University Centre for Public Health, there were roughly 23,000 deaths related to alcohol consumption in 2014 (rate 46 deaths per 100,000 population), of which nearly 18,000 were alcohol-specific (rate: 12 / 100,000, see below).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Time Period</th>
<th>Value</th>
<th>Count</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.01 - Alcohol-specific mortality</td>
<td>2012 - 14</td>
<td>16.08</td>
<td>12019.34</td>
<td>Male</td>
</tr>
<tr>
<td>2.01 - Alcohol-specific mortality</td>
<td>7.36</td>
<td>5735.76</td>
<td></td>
<td>Female</td>
</tr>
<tr>
<td>4.01 - Alcohol-related mortality</td>
<td>45.54</td>
<td>22966.75</td>
<td>Persons</td>
<td></td>
</tr>
<tr>
<td>4.01 - Alcohol-related mortality</td>
<td>2014</td>
<td>65.36</td>
<td>15065.79</td>
<td>Male</td>
</tr>
<tr>
<td>4.01 - Alcohol-related mortality</td>
<td>28.76</td>
<td>7900.96</td>
<td>Female</td>
<td></td>
</tr>
</tbody>
</table>

Source: Public Health England (July 2016), ‘Local Alcohol Profiles England’, dataset
Alcohol-related morbidity rates

UK statistics on morbidity are collected separately by the health agencies of each country and are calculated according to different sets of criteria (see *How alcohol mortality and morbidity rates are calculated in the UK* for further explanation).

**England**

Local Alcohol Profiles England (LAPE) publishes annual figures on alcohol-related hospital admissions throughout England, categorised by a broad and a narrow measure of morbidity. These are compiled in the Health and Social Care Information Centre *Statistics on Alcohol England* report.

**Alcohol admissions, by the Broad measure**

The latest figures (by the broad definition of hospital admissions, i.e. primary and secondary diagnoses) show that there are over a million alcohol-related admissions to English hospitals annually, of which over a quarter are wholly attributable, and the worst rate of admissions regionally occurring in the North East (see figure 8a).

Of the 305,140 cases wholly attributable to alcohol, the majority (203,700 or 67%) were down to mental and behavioural disorders due to the use of alcohol. Two-thirds, or 68% of admission episodes partially attributable to alcohol (533,560) were linked to admissions for cardiovascular disease (figure 8b).
Alcohol admissions, by the Narrow measure

By the narrow definition of hospital admissions, (i.e. primary diagnoses only) show that there are over 300,000 alcohol-related admissions to English hospitals annually, of which over nearly a third are wholly attributable, and the worst rate of admissions regionally occurring in the North East (see figure 9a).

In 2014/15, there were 333,340 alcohol-related hospital admissions in England, at a rate of 640 per 100,000 persons*

The highest rate of admissions occurred in the North East region

* 230,570 people were admitted to hospital

Source: Health and Social Care Information Centre, ‘Statistics on Alcohol England’
Of the 104,030 cases wholly attributable to alcohol, most (43%) were down to either mental and behavioural disorders due to the use of alcohol. Most admission episodes partially attributable to alcohol were linked to cancers (33%) or unintentional injury (32%) (see figure 9b).

Figure 9b: Alcohol-related hospital admissions, England (broad measure, by type)

Source: HSCIC
Wales

Alcohol admissions, by the Broad measure

According to Health Maps Wales (figure 10a), there were 53,314 alcohol-related admissions of 34,650 people to Welsh hospitals in 2014/15 by the broad measure (rate: 1,738 per 100,000 population).

The Monmouthshire region had the lowest rate of admissions (1,411 / 100,000), while neighbouring Blaenau Gwent had the highest (2,098 / 100,000).

### Table 10.5: Hospital Admissions due to Alcohol-attributable conditions Wales (broad), by region

<table>
<thead>
<tr>
<th>Rank</th>
<th>Region</th>
<th>Rate 2014/15</th>
<th>Count 2014/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monmouthshire</td>
<td>1,411.5</td>
<td>1,421</td>
</tr>
<tr>
<td>2</td>
<td>Cardiff</td>
<td>1,453.6</td>
<td>4,203</td>
</tr>
<tr>
<td>3</td>
<td>Ceredigion</td>
<td>1,502.8</td>
<td>1,204</td>
</tr>
<tr>
<td>4</td>
<td>Vale of Glamorgan</td>
<td>1,576.5</td>
<td>2,025</td>
</tr>
<tr>
<td>5</td>
<td>Bridgend</td>
<td>1,627.6</td>
<td>2,277</td>
</tr>
<tr>
<td>6</td>
<td>Gwynedd</td>
<td>1,660.1</td>
<td>2,092</td>
</tr>
<tr>
<td>7</td>
<td>Conwy</td>
<td>1,665.2</td>
<td>2,163</td>
</tr>
<tr>
<td>8</td>
<td>Powys</td>
<td>1,667.3</td>
<td>2,029</td>
</tr>
<tr>
<td>9</td>
<td>Wrexham</td>
<td>1,690.3</td>
<td>2,237</td>
</tr>
<tr>
<td>10</td>
<td>Isle of Anglesey</td>
<td>1,695.7</td>
<td>1,278</td>
</tr>
<tr>
<td>11</td>
<td>Flintshire</td>
<td>1,727.3</td>
<td>2,627</td>
</tr>
<tr>
<td>12</td>
<td>Denbighshire</td>
<td>1,737.7</td>
<td>1,732</td>
</tr>
<tr>
<td>13</td>
<td>Swansea</td>
<td>1,740.8</td>
<td>4,064</td>
</tr>
<tr>
<td>14</td>
<td>Carmarthenshire</td>
<td>1,784.9</td>
<td>3,501</td>
</tr>
<tr>
<td>15</td>
<td>Neath Port Talbot</td>
<td>1,829.9</td>
<td>2,607</td>
</tr>
<tr>
<td>16</td>
<td>Rhondda Cynon Taf</td>
<td>1,870.3</td>
<td>4,238</td>
</tr>
<tr>
<td>17</td>
<td>Torfaen</td>
<td>1,923.1</td>
<td>1,748</td>
</tr>
<tr>
<td>18</td>
<td>Newport</td>
<td>1,953.0</td>
<td>2,685</td>
</tr>
<tr>
<td>19</td>
<td>Merthyr Tydfil</td>
<td>1,979.3</td>
<td>1,123</td>
</tr>
<tr>
<td>20</td>
<td>Pembrokeshire</td>
<td>1,984.9</td>
<td>2,658</td>
</tr>
<tr>
<td>21</td>
<td>Caerphilly</td>
<td>2,028.8</td>
<td>3,506</td>
</tr>
<tr>
<td>22</td>
<td>Blaenau Gwent</td>
<td>2,068.8</td>
<td>1,431</td>
</tr>
<tr>
<td>Wales</td>
<td></td>
<td><strong>1,738.9</strong></td>
<td><strong>53,314</strong></td>
</tr>
</tbody>
</table>
Alcohol admissions, by the Narrow measure

Figure 10b shows that there were 15,989 alcohol-related admissions of 12,587 people to Welsh hospitals in 2014/15 by the narrow measure (rate: 524 per 100,000 population).

Cardiff had the lowest rate of admissions (429 / 100,000), while Blaenau Gwent again had the highest (603 / 100,000).
Scotland

The Information Services Division (ISD) in Scotland bases its morbidity figures by hospital records of discharges rather than admissions. These discrepancies in recording methods prevent a straightforward comparison between Scotland’s figures and those from its NHS England and Wales counterparts.

Figure 11 shows that there were 35,059 alcohol-related discharges involving 23,549 patients to Scottish hospitals in 2014/15 by the broad measure (rate: 672 per 100,000 population). Nearly half of those patients (49%, or 11,478) discharged over the twelve-month period were new.

Aberdeenshire had the lowest rate of admissions (306 / 100,000), while Glasgow had the highest (1,204 / 100,000).
Northern Ireland

The most recent figures produced by the Northern Ireland Department of Health show that there were more than 26,000 hospital admissions wholly attributable to alcohol, three-quarters of which stated mental and behavioural disorders due to use of alcohol as the cause (see figure 12 below).

Figure 12: Alcohol-related hospital admissions, Northern Ireland

Alcohol-related liver disease was the most common cause of alcohol-related death, accounting for nearly two-thirds of all alcohol-related deaths

<table>
<thead>
<tr>
<th>Wholly attributable conditions</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>F10 Mental and behavioural disorders due to use of alcohol</td>
<td>19,980</td>
</tr>
<tr>
<td>K70 Alcoholic liver disease</td>
<td>4,059</td>
</tr>
<tr>
<td>T51 Toxic effect of alcohol</td>
<td>2,197</td>
</tr>
</tbody>
</table>

Source: Northern Ireland Department of Health, (October 2015), ‘Acute episode based activity downloadable data 2014/15’
The health impacts of alcohol

This factsheet is published by the Institute of Alcohol Studies under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License (cc by-nc-sa 4.0)

All factsheets can be accessed via our Alcohol Knowledge Centre

For more information about what we do at the Institute of Alcohol Studies, please visit our website: www.ias.org.uk

Our core aim is to serve the public interest on public policy issues linked to alcohol. We do this by advocating for the use of scientific evidence in policy-making to reduce alcohol-related harm.