

**Alcohol-attributable diseases and dose-response curves for the Sheffield Alcohol Policy Model version 4.0**

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# Introduction

This document presents the list of health conditions related to alcohol which are included in the most recent version (4.0) of the Sheffield Alcohol Policy Model (SAPM). It also presents the corresponding dose-response curves (the mathematical relationships between volume of alcohol consumed and risk of morbidity/mortality) for all included conditions which are not wholly-attributable to alcohol. This is based on recent reviews by Rehm et al. (J Rehm, A, Shield, & Gmel, 2017; Jürgen Rehm et al., 2017) and Sherk et al. (Sherk, Stockwell, Rehm, Dorocicz, & Shield, 2017), as well as previous versions of the Sheffield Model (Meier et al., 2016) supplemented with additional evidence as appropriate. Note that SAPM considers only conditions which affect the drinker and therefore several conditions related to alcohol, such as Foetal Alcohol Spectrum Disorders, are therefore not included.

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The authors would like to thank Katrina Brown of Cancer Research UK, Kevin Shield of the Centre for Addiction and Mental Health in Toronto and Adam Sherk of the University of Victoria for their advice and input at various stages of the preparation of this document.

# List of alcohol-attributable diseases included in SAPM 4.0

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Condition** | **ICD-10 code(s)** | **Condition type\*** |
| Cancer | Oropharyngeal cancer | C00-06, C09-10, C12-C14 | Partial chronic |
| Cancer | Oesophageal cancer | C15 | Partial chronic |
| Cancer | Colorectal cancer | C18-C20 | Partial chronic |
| Cancer | Cancer of the liver and intrahepatic bile ducts | C22 | Partial chronic |
| Cancer | Pancreatic cancer | C25 | Partial chronic |
| Cancer | Laryngeal cancer | C32 | Partial chronic |
| Cancer | Breast cancer | C50 | Partial chronic |
| Cardiovascular | Hypertensive diseases | I10-I14 | Partial chronic |
| Cardiovascular | Ischaemic heart disease | I20-I25 | Partial chronic |
| Cardiovascular | Alcoholic cardiomyopathy | I42.6 | 100% chronic |
| Cardiovascular | Cardiac arrhythmias | I47-I49 | Partial chronic |
| Cardiovascular | Haemorrhagic stroke | I60-I62 | Partial chronic |
| Cardiovascular | Ischaemic stroke | I63-I67 | Partial chronic |
| Digestive | Cirrhosis of the liver (excluding alcoholic liver disease) | K70 (excl. K70.0-K70.4, K70.9), K73-K74 | Partial chronic |
| Digestive | Alcoholic Gastritis | K29.2 | 100% chronic |
| Digestive | Alcoholic liver disease | K70.0-K70.4, K70.9 | 100% chronic |
| Digestive | Acute pancreatitis (alcohol induced) | K85.2 | 100% chronic |
| Digestive | Acute pancreatitis | K85 (excl. K85.2, K85.3) | Partial chronic |
| Digestive | Chronic pancreatitis (alcohol induced) | K86.0 | 100% chronic |
| Digestive | Chronic pancreatitis | K86 (excl. K86.0) | Partial chronic |
| Poisoning | Excessive Blood Level of Alcohol | R78.0 | 100% acute |
| Poisoning | Toxic effect of alcohol | T51.0, T51.1, T51.8, T51.9 | 100% acute |
| Poisoning | Accidental poisoning by exposure to noxious substances | X40-X49 (excl. X45), Y10-Y14, Y16-Y19, T36-T50, T52-T65 | Partial acute |
| Poisoning | Alcohol poisoning | X45, X65, Y15 | 100% acute |
| Poisoning | Evidence of alcohol involvement determined by blood alcohol level | Y90 | 100% acute |
| Injuries | Transport injuries (including road traffic accidents) | V01-V98, Y85.0 | Partial acute |
| Injuries | Fall injuries | W00-W19 | Partial acute |
| Injuries | Exposure to mechanical forces (including machinery accidents) | W20-W52 | Partial acute |
| Injuries | Drowning | W65-W74, Y21 | Partial acute |
| Injuries | Fire injuries | X00-X09, Y26 | Partial acute |
| Injuries | Other Unintentional Injuries | W75-W99, X10-X33, Y20, Y22-Y25, Y27-Y29, Y31-Y34 | Partial acute |
| Injuries | Intentional self-harm | X60-X84 (excl. X65), Y87.0 | Partial acute |
| Injuries | Assault | X85-Y09, Y87.1 | Partial acute |
| Injuries | Other intentional injuries | Y35 | Partial acute |
| Endocrine | Diabetes (Type II) | E11 | Partial chronic |
| Endocrine | Alcohol-induced pseudo-Cushing's syndrome | E24.4 | 100% chronic |
| Mental Health | Acute intoxication | F10.0 | 100% acute |
| Mental Health | Mental and behavioural disorders due to use of alcohol | F10.1-F10.9 | 100% chronic |
| Nervous System | Degeneration | G31.2 | 100% chronic |
| Nervous System | Epilepsy and status epilepticus | G40-G41 | Partial chronic |
| Nervous System | Alcoholic polyneuropathy | G62.1 | 100% chronic |
| Nervous System | Alcoholic myopathy | G72.1 | 100% chronic |
| Other | Maternal care for (suspected) damage to foetus from alcohol | O35.4 | 100% chronic |
| Respiratory | Tuberculosis | A15-A19 | Partial chronic |
| Respiratory | Lower respiratory tract infections | J09-J18 | Partial chronic |

\* 100% conditions are those which are wholly-attributable to alcohol (i.e. which would not exist if nobody drank). Partial conditions are those which are partly attributable to alcohol but which would still exist, albeit with reduced prevalence, if nobody drank. Acute conditions are those which are related to intoxication. Chronic conditions are those which are related to chronic alcohol consumption in the longer term.

# Dose-response curves for partially alcohol attributable chronic conditions

Relative risk of harm for drinkers at consumption level , measured in grams of ethanol per day, versus lifetime abstainers. Due to small sample sizes, published risk functions are not stable above 150g/day, so we assume for all conditions. All risk functions are applied to both genders and for both mortality and morbidity except where stated otherwise.

## Cancers

### Oropharyngeal

C00-06, C09-10, C12-14

Source (Bagnardi et al., 2015)

### Oesophageal

C15

Source (Bagnardi et al., 2015)

Notes: Oesophageal cancer has two main histological types: Squamous Cell Carcinoma (SCC) and Adenocarcinoma (AC). Alcohol is only associated with SCC, not AC (Bagnardi et al., 2015). The relative prevalence of SCC and AC varies widely between countries and within population subgroups (Arnold, Soerjomataram, Ferlay, & Forman, 2015) and it may therefore be necessary to apportion overall oesophageal cancer prevalence between SCC and AC using external data such as that from cancer registries.

### Colorectal

C18-C20

Source (Bagnardi et al., 2015)

### Liver and intrahepatic bile ducts

C22

Source (Chuang, Lee, Wu, Straif, & Hashibe, 2015)

Notes: Bagnardi et al., which we use as the source for all other cancer risk curves do provide a curve for liver cancer, however this has extremely high Relative Risks at high levels of consumption (RR=45 at 150g/day), driven by high risks from a small number of case-control studies. Alternative meta-analyses from Chuang et al and Turati et al have found lower risks at high levels of consumption (Chuang et al., 2015; Turati et al., 2014), however these risk curves are still quite divergent. It may therefore be advisable to present modelled estimates using several alternative sources to illustrate the impact of this uncertainty.

### Pancreatic

C25

Source (Bagnardi et al., 2015)

### Laryngeal

C32

Source (Bagnardi et al., 2015)

### Breast

C50

**Female**

Source (Bagnardi et al., 2015)

## Cardiovascular diseases

### Hypertensive diseases

I10-I14

**Male**

**Female**

Source (J Rehm et al., 2017)

### Ischaemic heart disease

I20-I25

**Mortality**

**Male 16-34**

 **35-64**

 **65+**

**Female 16-34**

**35-64**

**65+**

Source (Jürgen Rehm, Shield, Roerecke, & Gmel, 2016)

Notes: All protective effects are removed for drinkers who consume more than 60g in a single drinking occasion at least once per month, as per (Roerecke & Rehm, 2010)

**Morbidity**

**Male**

**Female**

 Source (Roerecke & Rehm, 2012)

Notes: All protective effects are removed for drinkers who consume more than 60g in a single drinking occasion at least once per month, as per (Roerecke & Rehm, 2010)

### Cardiac arrhythmias

I47-I49

Source (Andriy V. Samokhvalov, Irving, & Rehm, 2010)

### Haemorrhagic and other non-ischaemic stroke

I60-I62

**Mortality**

**Male**

**Female**

Source (Patra et al., 2010)

**Morbidity**

**Male**

**Female**

Source (Patra et al., 2010)

### Ischaemic stroke

I63-I67

**Mortality**

**Male 16-34**

 **35-64**

**65+**

**Female 16-34**

 **35-64**

 **65+**

Source (Jürgen Rehm et al., 2016)

Notes: All protective effects are removed for drinkers who consume more than 60g in a single drinking occasion at least once per month, as per (Jürgen Rehm et al., 2016)

**Morbidity**

**Male**

**Female**

Source (Patra et al., 2010)

Notes: All protective effects are removed for drinkers who consume more than 60g in a single drinking occasion at least once per month, as per (Jürgen Rehm et al., 2016)

## Digestive diseases

### Cirrhosis of the liver

K70 (excl. K70.0-K70.4, K70.9), K73-K74

**Mortality**

**Male**

**Female**

**Morbidity**

**Male**

**Female**

Source (Jürgen Rehm et al., 2010)

### Acute pancreatitis

K85 (excl. K85.2, K85.3)

**Male**

**Female**

Source (Andriy V Samokhvalov, Rehm, & Roerecke, 2015)

### Chronic pancreatitis

K86 (excl. K86.0)

Source (Andriy V Samokhvalov et al., 2015)

## Endocrine diseases

### Diabetes mellitus (type II)

E11

**Male**

**Female**

Source (Knott, Bell, & Britton, 2015)

## Diseases of the nervous system

### Epilepsy and status epilepticus

G40-G41

Source (A V Samokhvalov, Irving, Mohapatra, & Rehm, 2010)

## Respiratory diseases

### Tuberculosis

A15-A19

Source (Imtiaz et al., 2017)

### Lower respiratory tract infections

J09-J18

Source (A V Samokhvalov, Irving, & Rehm, 2010)

# Dose-response curves for partially alcohol attributable acute conditions

Relative risk of harm for drinkers at consumption level , measured in grams of ethanol consumed *on a single drinking occasion*, versus non-drinkers. All risk functions are applied to both genders and for both mortality and morbidity except where stated otherwise.

## Transport Injuries

V01-V98, Y85.0

Source (Cherpitel, Ye, Bond, Borges, & Monteiro, 2015)

## Violent injuries

X85-Y09, Y87.1 & Y35

Source (Cherpitel et al., 2015)

## Falls

W00-W19

Source (Cherpitel et al., 2015)

## Other injuries

W20-W52, W65-W74, Y21, X00-X09, Y26, W75-W99, X10-X33, Y20, Y22-Y25, Y27-Y29, Y31-Y34, X60-X84 (excl. X65), Y87.0,

Source (Cherpitel et al., 2015)

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