The Scottish Government

The Societal Cost of Alcohol Misuse in Scotland for 2007

Health and Community Care

social research

THE SOCIETAL COST OF ALCOHOL MISUSE IN SCOTLAND FOR 2007

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The views expressed in this report are those of the researcher and do not necessarily represent those of the Scottish Government or Scottish Ministers.

Table of Contents

List of Tables

List of Figures

EXECUTIVE SUMMARY

E.1 Although alcohol is widely recognised as a major generator of employment and income from exports in Scotland, a considerable (and increasing) amount of harm is associated with its misuse. The effects of this misuse are wide, and generate substantial costs not only for the health service, but also for criminal justice, communities, employers, the wider Scottish economy, and Scottish society as a whole.

E.2 The specific aim of this project was to derive estimates of the cost of alcohol misuse in Scotland for 2007. Several estimates have been made of these costs during the 2000s, with a number of elements of the latter studies being updates of the findings of the original study published by the Scottish Executive in 2001. The objectives required to achieve this aim include:

- Reviewing the existing literature and approaches used in other costing studies, particularly those related to alcohol misuse;
- Identifying new research studies or data that will enable more robust estimates of the costs of alcohol misuse to be derived;
- Deriving estimates of the economic and social costs associated with alcohol.

E.3 Literature searches were undertaken to identify the key features of generic cost-of-illness (COI) studies. Recent developments in studies of the costs of substance misuse (including alcohol misuse) have included the development of international guidelines for undertaking such studies (to promote consistency), increased interest in identifying avoidable costs, and the importance of performing sensitivity analysis. In addition, the findings and methodology of a review of the effects of alcohol pricing and promotion comprising a systematic literature review and some modelling were included. Literature searches were also undertaken to identify the most recent relevant data on activity (where available) and unit costs for inclusion in the analysis, including information on alcohol-attributable fractions for health-related and other outcomes (e.g. crime) influenced by alcohol misuse.

E.4 The total number of hazardous adult drinkers (i.e. aged 16+ years) in Scotland in 2007 – defined for males as drinking over 21 units per week and for females as drinking over 14 units per week – is estimated to be about 1,047,000. This number comprises about 605,000 males and 442,000 females and displays a steep downward age gradient for both sexes. The number of harmful adult drinkers – defined for males as over 50 units per week and for females as over 35 units per week – is estimated to be about 230,000. This number comprises about 141,000 males and 88,000 females and also displays a steep downward age gradient for both sexes. However, it should be noted that estimating numbers of drinkers and people who misuse alcohol is hampered by a lack of consistent national data and a tendency for those completing surveys that ask questions about alcohol consumption to under-report the extent of their drinking.

E.5 Most cost-of-illness studies include the direct costs associated with the use of services such as health care, social services and crime, and indirect costs such as the economy's lost productive capacity due to premature deaths. However, such studies frequently avoid estimating the intangible costs (e.g. pain, grief and suffering) associated with alcohol misuse due to methodological concerns. This study includes estimates of the relevant direct, indirect and intangible costs associated with alcohol misuse. These costs are considered to fall into the following categories:

- Health care;
- Social care;
- Crime;
- Productive capacity of the Scottish economy;
- Wider social costs.

E.6 It is important to note that comparisons between countries and over time within a specific country should be avoided. This is partly because countries tend to manage and/or fund their alcohol services differently and also because information from research studies and other data availability tend to improve over time, resulting in increasingly sophisticated studies.

E.7 The estimated societal costs for Scotland in 2007 due to alcohol misuse are summarised in Table E.1. It is important to recognise the levels of uncertainty around many of the generated costs and the fact that this has led to values that should only be considered as indicative. Where possible, two cost figures have been displayed. The first figure is based on assumptions that generate the lowest cost estimate and the second figure is based on assumptions that generate the highest cost estimate.

Table E.1: Estimated societal costs of alcohol misuse in Scotland for 2007

Resource	Annual Cost (£ million)	
	Range	Mid-point
HEALTH SERVICE		
GP and practice nurse consultations	15.1	15.1
Community Psychiatric Team visits	3.4 – 3.9	3.6
Community prescribed drugs	0.9	0.9
Laboratory tests	0.2	0.2
Non-psychiatric inpatient days	34.3 – 132.8	83.5
Psychiatric inpatient days	32.8 – 39.7	36.2
Maternity inpatient days	0.02 – 0.03	0.02
A&E attendances	2.8 – 55.9	29.0
Outpatient attendances	11.4 – 30.4	20.9
Hospital day cases	0.9 – 2.5	1.7
Ambulance journeys	1.4 – 47.5	24.4
Alcohol services	40.6 – 64.0	52.3
SUB-TOTAL	**143.6 – 392.8**	**267.8**
SOCIAL CARE		
Social care in relation to children and families	104.0 – 312.0	208.1
Criminal justice social work	7.0 – 27.4	17.2
Care homes	1.7 – 3.4	2.5
Children's Hearing System	1.6 -3.9	2.7
SUB-TOTAL	**114.2 – 346.8**	**230.5**
CRIME		
Alcohol-specific offences	8.2	8.2
Alcohol-related offences - costs in anticipation of crime	14.1 – 28.5	21.3
Alcohol-related offences - costs as a consequence of crime	354.0 – 757.7	555.8
Alcohol-related offences - costs in response to crime	86.2 – 197.3	141.8
SUB-TOTAL	**462.5 – 991.7**	**727.1**
PRODUCTIVE CAPACITY OF THE SCOTTISH ECONOMY		
Foregone productive capacity by workforce participants due to presenteeism, absenteeism, unemployment and premature alcohol-related mortality	725.2 – 1,006.1	865.7
SUB-TOTAL	**725.2 – 1,006.1**	**865.7**
WIDER SOCIAL COSTS		
Cost of premature mortality: value of lost activity prior to retirement by non-participants in the workforce	52.0 – 63.8	57.9
Cost of premature mortality: value of lost activity post-retirement and prior to life expectancy	96.6 – 110.5	103.6
Cost of premature mortality: intangible social costs associated with life years lost	882.5 – 1,723.7	1,303.1
SUB-TOTAL	**1,031.1 – 1,898.0**	**1,464.6**
OVERALL TOTAL	**2,476.6 – 4,635.4**	**3,555.7**

E.8 In conclusion, alcohol misuse imposes a substantial burden on Scottish society, costing between about £2,476.6 million and £4,635.4 million per year at 2007/08 prices, with a mid-point of £3,555.7. Based on the mid-point of this range, 7.5% of costs are due to health service expenditure, 6.5% to social work services, 20.4% to crime, 24.3% to productive capacity, and 41.2% to wider social costs. In terms of the statutory agencies, alcohol misuse imposes the greatest burden on the health care system, followed by social care services.

1 INTRODUCTION

Overview

1.1 Although alcohol is widely recognised as a major generator of employment and income from exports in Scotland, a considerable (and increasing) amount of harm is associated with its misuse. The effects of this misuse – which are considered in this paper – are wide, and generate substantial costs not only for the health service, but also for criminal justice, communities, employers, and the wider Scottish economy.

1.2 A significant report by Catalyst Health Economics Consultants was published in 2001 by the (then) Scottish Executive (Scottish Executive, 2001) on the trends and costs associated with alcohol misuse in Scotland, with relatively minor internal updates in 2004 (Scottish Executive, 2004) and 2008 (Scottish Government, 2008a). The Scottish Government commissioned this research (by York Health Economics Consortium at the University of York) to review the existing literature and approaches used in recent costing studies and other relevant publications and to examine the current cost of alcohol misuse in Scotland across a range of appropriate domains, including health, criminal justice and wider economic costs.

Recent Policies Relating to Alcohol

1.3 In recent years the Scottish Executive and, latterly, the Scottish Government has published a number of policy documents and introduced a series of initiatives relating to alcohol use and misuse[1]. The Scottish Government published *Changing Scotland's Relationship with Alcohol: A Framework for Action* (Scottish Government, 2009), on 2 March 2009, following a public consultation on the proposals in a 2008 discussion paper (Scottish Government, 2008b). The Framework sets out a package of measures to address issues around reducing alcohol consumption; tackling the damaging impact alcohol misuse has on Scottish families and communities; encouraging positive attitudes and positive choices; and improving the support and treatment available.

1.4 A number of new actions are already underway. Significant investment to tackle alcohol misuse was announced in March 2008, with the majority of funding being routed through NHS Scotland to deliver increased screening for alcohol problems, access to early intervention, and enhanced treatment and support services. A new programme target for the delivery of alcohol brief interventions (150,000 interventions over three years from 2008) by NHS Boards has been established. This is being supported by a comprehensive national training programme for staff involved in delivering brief interventions. The Licensing (Scotland) Act 2005 came fully into force in September 2009 and is based on five key licensing objectives, including protecting and improving public health; protecting children from harm; and securing public

[1] A succinct summary of recent policies and trends in alcohol consumption can be found in Chapter 3: Alcohol Consumption in *the Scottish Health Survey (SHeS) 2008* (Scottish Government, 2009a).

safety. Amongst a package of measures, the Act imposes limits on irresponsible alcohol promotions in licensed premises.

1.5 The Scottish Government brought the new regulatory measures set out in the Framework together in the Alcohol, etc (Scotland) Bill introduced to Parliament in November 2009. The Bill includes proposals to introduce a minimum price per unit of alcohol; further restrictions on the supply of alcoholic drinks free of charge or at a reduced price in off-sales; restrictions on the location of drink promotions within off-sales premises; and local provisions for raising the purchase age of alcohol in off-sales to 21.

Aim and Objective of Study

1.6 The specific aim of the project is to derive estimates of the cost of alcohol misuse in Scotland for 2007 (the latest year for which the majority of data are available). The objectives required to achieve this aim include:

- Reviewing the existing literature and approaches used in other costing studies, particularly those related to alcohol misuse;
- Identifying new research studies or data that will enable more robust estimates of the costs of alcohol misuse to be derived;
- Deriving estimates of the economic and social costs associated with alcohol misuse in Scotland.

Defining Alcohol Misuse

1.7 Alcohol consumption can be classified in many ways. One of the most helpful approaches is to categorise use of alcohol for the purpose of assessing the need for treatment. This is done by applying the World Health Organisation's International Classification of Mental Disorders (10th revision, 1992). Alcohol Use Disorders (AUDs) are classified according to three categories reflecting increasing levels of risk and harm associated with alcohol consumption:

- Hazardous Alcohol Use;
- Harmful Alcohol Use;
- Alcohol Dependence.

1.8 Drinkers not meeting the criteria for an AUD are described variously as 'sensible drinkers' or 'low risk drinkers' (Drummond *et al.*, 2009). Further information about the numbers of people misusing alcohol in Scotland is provided in Section 2.

Structure of Report

1.9 This report considers some recent data on weekly alcohol consumption in Scotland by age and gender in Section 2. The adopted methodology, which is based around that for cost-of-illness studies, is outlined in Section 3. Section 4 briefly summarises some recent studies of the costs of alcohol misuse in Scotland and elsewhere.

1.10 The subsequent sections focus on the five broad aspects associated with alcohol misuse covered in this study – costs relating to healthcare services (Section 5); social care costs (Section 6); costs relating to crime (Section 7); costs to the Scottish economy due to lost productive capacity (Section 8); and the wider costs (including intangible costs) of alcohol misuse to Scottish society (Section 9). The findings are discussed in Section 10.

2 THE SCALE OF ALCOHOL MISUSE IN SCOTLAND

Summary

- This chapter provides an estimate of the scale of alcohol misuse in Scotland in 2007 (the base year for the study due to overall data availability), using consumption estimates from 2008.
- Data from the Scottish Health Survey (SHeS) 2008 suggest that males in Scotland drink an average of 18 units of alcohol per week, compared with an equivalent average of 8.6 units by females.
- The total number of hazardous adult drinkers (i.e. aged 16+ years) in Scotland in 2007 – defined for males as drinking over 21 units per week and for females as drinking over 14 units per week – is estimated to be about 1,047,000.
- This number comprises about 605,000 males and 442,000 females and displays a steep downward age gradient for both sexes.
- The number of harmful adult drinkers – defined for males as over 50 units per week and for females as over 35 units per week – is estimated to be about 230,000.
- This number comprises about 141,000 males and 88,000 females and also displays a steep downward age gradient for both sexes.

Overview

2.1 The purpose of this chapter is to provide an estimate of the scale of alcohol misuse in Scotland. It identifies the possible number of alcohol misusers in 2007 based on data from the Scottish Health Survey (SHeS) 2008 (Scottish Government, 2009a).

2.2 It should be noted that that estimating numbers of drinkers (especially those drinking alcohol "to excess") is hampered by the use of different measures (e.g. some measures of alcohol misuse are based on levels of consumption, whilst others are diagnostic-based) and by a tendency for those completing surveys asking questions about alcohol consumption to under-report the extent of their drinking.

2.3 For example, the recently-published SHeS 2008 found that, on average, men drank 18 units of alcohol per week and women drank 8.6 units per week. However, data on Scottish alcohol sales provided to the Scottish Government by the Nielsen Company[2] indicate that almost 23 units of alcohol per person per week were sold in Scotland in 2007.

[2] See http://www.scotland.gov.uk/Topics/Health/health/Alcohol/resources/nielson-data.

Categorising Problematic Drinking

2.4 The three categories of alcohol use disorders (AUDs) identified in Section 1 are described as follows in the recently-published Scottish Alcohol Needs Assessment (Drummond *et al.* 2009):

- **Hazardous alcohol use:** drinking above a level that may cause harm in the future, but is not currently causing clear evidence of harm. For practical purposes the current guidelines (as endorsed by the Government and the Royal Colleges) is that adult men should not exceed four units a day or 21 units per week and that adult women should not exceed three units a day or 14 units in a week.
- **Harmful alcohol use:** drinking at a level that is leading to current evidence of physical, social or psychological harm. This category includes a wide range of problems and exists on a wide spectrum of severity (e.g. from alcohol-related injuries to life-threatening chronic alcoholic liver disease; from absenteeism after an isolated drinking binge through to job loss).
- **Alcohol dependence:** is defined within the World Health Organisation's International Classification of Diseases 10th Revision (ICD10) as the individual having three or more of a range of symptoms of alcohol dependence including: tolerance, alcohol withdrawal, craving, relief of withdrawal, neglect of alternative pleasures, and persistence of drinking despite negative consequences.

2.5 It is, however, important to recognise that, whilst these categories of AUD are presented within ICD10 as being exclusive, in reality the harms relating to drinking and alcohol dependence each exist on a continuum of severity with no clearcut points at which they can be said to be absent or present, moderate or severe.

Numbers of Hazardous and Harmful Drinkers in Scotland

2.6 The SHeS 2008 includes data on alcohol consumption from which the numbers of males and females drinking at hazardous and harmful levels can be estimated. In the following estimates, hazardous drinking is measured as the proportions of adults drinking over 21 (male) and 14 (female) units per week. Those drinking over 50 (male) and 35 (female) units per week are used as a proxy for the numbers of harmful drinkers. It has not been possible to estimate the numbers with alcohol dependency[3] (and such data are not required for the subsequent analysis).

2.7 Table 2.1 shows the estimated numbers of hazardous and of harmful drinkers by gender and age-band determined by applying the relevant proportions from SHeS 2008 to the General Register Office for Scotland (GROS) 2007 mid-year population estimates for adults aged 16+. The data assume that there were no changes in consumption levels between 2007 and 2008.

[3] As defined in paragraph 2.4.

2.8 The total number of hazardous drinkers in 2007 was estimated to be about 1,047,000 (comprising 605,000 males and 442,000 females) and the total number of harmful drinkers was estimated to be about 230,000 (comprising about 141,000 males and 88,000 females). Both sets of data display a steep downward age gradient for males and females.

Table 2.1: Estimated numbers of hazardous drinkers and harmful drinkers aged 16+ years in Scotland in 2007

	Mean units per week (standard error of mean)	% with estimated hazardous weekly alcohol consumption	% with estimated harmful weekly alcohol consumption	General Population Estimate[4]	Number of hazardous drinkers	Number of harmful drinkers
Age: Male						
16 – 24	23.5 (1.96)	41	13	311,214	127,598	40,458
25 – 34	17.8 (1.43)	28	7	313,031	87,649	21,912
35 - 44	19.4 (1.37)	31	8	374,502	116,096	29,960
45 – 54	19.0 (1.09)	32	8	354,986	113,596	28,399
55 – 64	18.0 (1.07)	31	6	308,397	95,603	18,504
65 - 74	13.8 (0.86)	25	4	209,949	52,487	8,398
75+	8.3 (0.69)	14	1	144,225	20,192	1,442
Total	***18.0 (0.53)***	***30***	***7***	***2,016,304***	***604,891***	***141,141***
Age: Female						
16 – 24	16.2 (1.86)	37	11	299,552	110,834	32,951
25 – 34	8.2 (0.54)	20	3	316,257	63,251	9,488
35 - 44	9.9 (0.69)	22	4	406,254	89,376	16,250
45 – 54	9.2 (0.60)	23	4	373,805	85,975	14,952
55 – 64	7.2 (0.44)	19	2	323,638	61,491	6,473
65 - 74	5.4 (0.51)	12	2	247,427	29,691	4,949
75+	2.7 (0.36)	4	1	244,012	9,760	2,440
Total	***8.6 (0.34)***	***20***	***4***	***2,210,945***	***442,189***	***88,438***

Source: SHeS 2008 and GROS.

[4] General Register Office for Scotland, Estimated population by age and sex, Scotland: 30 June 2007; http://www.gro-scotland.gov.uk/files1/stats/population-estimates/07_mye-booklet-final-upd21082008.pdf

3 METHODOLOGY

Summary

- Literature searches were undertaken to identify the key features of generic cost-of-illness (COI) studies.
- The application of the COI methodology to studies of substance misuse (including alcohol misuse) was also considered.
- Recent developments in studies of the costs of substance misuse have included the development of international guidelines for undertaking such studies (to promote consistency), increased interest in identifying avoidable costs, and the importance of performing sensitivity analysis.
- A recent review of the effects of alcohol promotion and pricing in England (which included a systematic literature review and modelling) was also considered, along with a model-based appraisal of alcohol minimum pricing and off-licensed trade discount bans in Scotland (undertaken by the University of Sheffield).
- These studies helped to identify the key aspects and elements for inclusion in this study.
- Literature searches were also undertaken to identify the most recent relevant data on activity (where available) and unit costs for inclusion in the analysis.

Overview

3.1 This section outlines the methodology that was employed to meet the aim and objectives set out in paragraph 1.6. It centres on the cost-of-illness (COI) approach. More detailed information about the cost-of-illness approach, and its application to alcohol misuse, is contained in Appendix A.

3.2 The methodology can be split into two phases:

- Phase I: Literature searching and review;
- Phase II: Derivation of costs associated with alcohol misuse in Scotland.

Literature Searching and Review

3.3 Literature searches were undertaken to identify:

- Generic COI study methods;
- COI studies relevant to alcohol misuse;
- Research studies and data with more recent and/or more robust data for the estimates of alcohol misuse.

3.4 The key methodological publications identified through the literature search were used to:

- Consider recent developments in undertaking generic COI studies to determine whether some or all of these developments need to be taken into account within this research on alcohol misuse;
- Determine the specific aspects that should be included in a study of the costs associated with alcohol misuse (e.g. alcohol-related health care costs; alcohol-related criminal justice costs);
- Determine the specific service elements that should be included within each aspect (e.g. GP prescribing; community-based support) to reflect current modes of treatment delivery and service responses to alcohol misuse (which may have changed considerably in recent years) – all desirable elements were identified initially, even if it subsequently transpired that the necessary quantitative data are not available within Scotland.

3.5 In addition, three other recent studies were identified that were used to inform this research. One was a major independent review undertaken at the University of Sheffield of the effects of alcohol pricing and promotion. This study (which was undertaken for the Department of Health) comprised two elements – a systematic review of the relevant (international) literature (Booth *et al.*, 2008) and a modelling exercise around alcohol pricing and promotion (Brennan *et al.*, 2008). The second study – a model-based appraisal of alcohol minimum pricing and off-licensed trade discount bans in Scotland (Purshouse *et al.*, 2009) – was also undertaken at the University of Sheffield. The third study, undertaken for the Scottish Government by researchers at the Universities of Glasgow and York, provides initial estimates of the size and value of the illicit drugs market, and estimates of the social and economic cost of illicit drug use in Scotland for the year 2006 (Scottish Government, 2009c).

3.6 Alcohol attributable fractions are used internationally in the literature to express the extent to which alcohol contributes to a health outcome (such as deaths or hospital admissions) or other outcomes such as road traffic injuries, drownings, violence, crime, and homicides. A significant recent publication (especially for the analysis of health-related costs and of premature mortality) considered alcohol attributable mortality and morbidity through calculating alcohol population attributable fractions for Scotland (NHS National Services Scotland, 2009b).

Generic Cost-of-Illness Studies

3.7 COI studies (which are sometimes known as burden-of-illness studies) have been undertaken in many countries for many years. They analyse the total costs incurred by a society due to a specific disease. According to Jefferson *et al.* (2000), "*the aim of COI studies is descriptive: to itemise, value, and sum the costs of a particular problem with the aim of giving an idea of its economic burden*". This requires recognising, identifying, listing, measuring and valuing the costs generated by an illness.

3.8 They can adopt either a prevalence method or an incidence method. The prevalence method (which is adopted in this study) considers the costs associated with all of the affected patients in relation to a specific period; the incidence method only takes account of patients who have fallen ill during the period. Costs occurring outwith the period of time under consideration (e.g. outwith a specific financial year) need to be discounted to reflect their present value.

3.9 COI studies generally examine the following costs:

- Direct costs – for example, those borne by the healthcare system, community and family in directly addressing the problem;
- Indirect costs – mainly productivity losses to the national economy caused by the problem or diseases, which may be borne by the individual, family, society, or by the employer.

3.10 Intangible costs (e.g. those caused by pain, suffering and loss) are often omitted from such studies due to problems with their quantitative measurement.

3.11 The COI methodology has been criticised over the years for a variety of reasons. For example, it takes into account only the costs of resources but not the utility gain of reducing the illness. The approach does not compare alternative uses of resources and therefore may not adequately measure opportunity costs. It does not define choices and cannot help directly in making them. It can also place over-reliance on average rather than marginal costs, which can lead to a systematic over-estimation of the size of the burden.

Cost-of-Illness Studies for Substance Misuse

3.12 Many studies have been undertaken globally in recent years addressing the societal costs of substance misuse. Some have focussed only on alcohol misuse, but many have also included the costs associated with the use of illicit drugs and/or tobacco. Many of these studies have been undertaken in "*developed societies with middle range levels of alcohol consumption and levels of hazardous drinking*" (Rehm *et al*., 2004), with medium to high expenditure on health and welfare (e.g. Northern Europe, North America and Australia).

3.13 Although each study adopts a different approach to the aspects included in its cost estimates, cost-of-alcohol studies generally include costs associated with health care, productivity loss, and the criminal justice system. However, many of the earlier studies adopted differing approaches, which exacerbated problems of comparability between studies[5].

[5] Problems causing difficulties in comparing studies over time and between countries include the different ways that services are delivered and the different types of information that are recorded.

3.14 This led to the development of international guidelines for undertaking such studies, as outlined below.

Development of International Guidelines

3.15 The first set of international guidelines for estimating the costs of substance abuse (by a Canadian team led by Eric Single) was published in 2001 (Single *et al.*, 2001). The second edition was published by the World Health Organisation in 2003 (Single *et al.*, 2003).

3.16 This document presents a general framework for the development of cost estimates. Studies of the economic costs of substance abuse/misuse are described as a type of cost-of-illness study in which the impact of substance abuse on the material welfare of a society is estimated by examining the social costs of treatment, prevention, research, law enforcement and lost productivity plus some measure of the quality of life years lost, relative to a counterfactual scenario in which there is no substance abuse.

3.17 The 2003 guidelines point out that the avoidable costs are of more interest to policy makers:

> *"Estimates of the total costs of drug abuse comprise both avoidable and unavoidable costs. Unavoidable costs comprise the costs which are currently borne relating to drug abuse in the past, together with the costs incurred by the proportion of the population whose level of drug consumption will continue to involve costs. Avoidable costs are those costs which are amenable to public policy initiatives and behaviour change."*

3.18 Subsequently, the International Guidelines for the Estimation of the Avoidable Costs of Substance Abuse were commissioned by Health Canada from the Canadian research team and published in 2006 (Collins *et al.*, 2006). However, as these guidelines point out, the work was expected to evolve and "*before avoidable costs can be estimated, good basic data on aggregate costs of the substance being studied must already exist*".

3.19 Furthermore, the document also recognises that many of the identified costs of substance abuse, even if avoidable, may only be reduced or eliminated over long lead times. The guidelines also point out that considerable uncertainty is associated with many cost estimates relating to alcohol misuse, and stress the importance of undertaking sensitivity analysis.

3.20 This current study is based upon the methodology proposed in the international guidelines (although these methods are generally not described in detail in the guidelines). Due to the limitations identified above, this study considers all of the costs associated with alcohol misuse in Scotland in a particular year (i.e. 2007). The five specific cost categories that are addressed (see paragraph 1.10) are drawn from a variety of recent studies of alcohol misuse in the UK, and (unlike many previous studies) include estimates of some of the intangible costs associated with alcohol misuse.

Derivation of Costs Associated with Alcohol Misuse in Scotland

3.21 Once the relevant aspects and elements for inclusion in the study had been identified (based on the review of the relevant international literature), the literature[6] and other appropriate data sources were used to populate these with appropriate epidemiological and activity data, to which monetary values were then assigned.

3.22 This involved:

- Estimating a relevant number and applying a unit cost to this – estimating the number often required considerable analysis of the underlying epidemiological and activity data (e.g. for hospital bed days);
- Estimating a relevant percentage of the total expenditure on a specific aspect (this is likely to be 100% in the case of specific funding for/expenditure on alcohol-related campaigns);
- Recognising that it was not possible to quantify some relevant aspects.

3.23 With regard to the relevant unit costs, Scottish data were used for costs wherever possible, although it is important to recognise that there may be considerable variation across Scotland. Where there was a lack of Scotland-specific cost data and/or where the researchers believed that valuable information could be found in other sources (e.g. costs relating to specific types of crimes in England), this information was included in the calculations. As a consequence, the overall costs should be treated as being indicative only.

[6] It should be noted that this literature often drew upon relatively dated research and data.

4 RECENT STUDIES OF ALCOHOL MISUSE

Summary

- Studies of the costs of alcohol misuse using cost-of-illness methodologies have been undertaken in several high-income and some middle-income countries in recent years.
- The key Scottish study was undertaken in 2001 (Scottish Executive, 2001) and estimated that the annual societal cost of alcohol misuse (in 2001/02 prices) was £1,070.6 million (i.e. £1.07 billion);
- This study was updated in 2008 (Scottish Government, 2008a), concluding that the annual societal of alcohol misuse (in 2006/07 prices) was £2,250 million (i.e. £2.25 billion).
- Similar analysis was undertaken in England (using 2001/02) prices (Cabinet Office Strategy Unit, 2003), with the costs to the NHS being updated (to 2006/07 prices) in 2008 (Department of Health, 2008).
- Caution should always be exercised when making comparisons over time and/or between different countries, due to different approaches, systems, and data availability.

Overview

4.1 This Chapter (read in conjunction with Appendix B) summarises the main findings from other COI studies of the costs of alcohol misuse in Scotland and England.

4.2 Appendix B also briefly considers a number of recent studies from several other countries. Comparisons between studies should be made with extreme caution, due to differences in service provision, data collection and data availability between countries and over time.

Previous Scottish Studies

4.3 The original report on the costs of alcohol misuse in Scotland was undertaken by Catalyst Health Economics Consultants in 2001 (Scottish Executive, 2001). This was updated by the Scottish Executive in July 2004 (Scottish Executive, 2004) and by the Scottish Government in April 2008 (Scottish Government, 2008a).

4.4 Their findings are summarised in Table 4.1. Additional information is included in Appendix B.

Table 4.1: Estimated Costs of Alcohol Misuse in Scotland from Recent Cost-of-Illness Studies – annual cost (£m)

Resource Category	2001/02	2003/04	2006/07
NHS Scotland	96	111	405
Social Work Services	86	97	170
Criminal Justice and Emergency Services/Fire Service	268	277	385
Wider Economic Costs	405	418	820
Human Costs	217	224	470
Total	**1,071**	**1,126**	**2,250**

Source: Reports cited in paragraph 4.3.

Previous English Studies

4.5 The most significant report for England was undertaken by the Cabinet Office Strategy Unit and published in 2003 (Cabinet Office Strategy Unit, 2003). This report estimated the costs in England associated with alcohol misuse in 2001. The health-related costs were updated for 2006/07 by the Department of Health's Health Improvement Analytical Team (Department of Health, 2008). Further details are included in Appendix B.

4.6 Table 4.2 shows the costs from the Cabinet Office Strategy Unit's study in 2003. This study presented the findings under three (rather than five) resource groups. The study for England includes high and low estimates for some of the resources used, and these are also shown in Table 4.2.

Table 4.2: Estimated Costs of Alcohol Misuse in England, 2001 prices (£m)

Resource Category	First Estimate	Second Estimate
Health Care Costs	1,384	1,682
Workplace and Wider Economy Costs	5,194	6,421
Costs of alcohol-related and alcohol-specific crime	11,940	11,940
Total	**18,517**	**20,044**

Source: Cabinet Office Strategy Unit, 2003.

Other Studies

4.7 Many cost-of-alcohol studies have been published during the 1990s and 2000s. These have mainly been for high-income countries (e.g. USA; Canada; Sweden), though some have been for middle-income countries (e.g. Thailand).

4.8 The findings from several such studies have been summarised in terms of comparable costs by other authors (e.g. Johansson *et al.*, (2006); Rehm *et al.*, (2009)). Summaries of some of their findings are presented in tabular form in Tables B.3 and B.4 in Appendix B.

4.9 Although some of the findings are of general interest, considerable caution should be exercised when making any comparisons, due to different approaches, systems, and data availability. Nevertheless, these studies do provide useful contextual information in terms of the approach adopted and the types of categories included in the cost estimates.

5 HEALTHCARE SERVICES: RESOURCE USE AND COSTS

Summary

- There were an estimated 470,752 GP and Practice Nurse consultations attributable to alcohol misuse, resulting in an estimated cost of approximately £15.1 million.
- It is estimated that Community Psychiatric Team visits in relation to alcohol misuse cost between £3.4 million and £3.9 million, with a mid-point of £3.6 million.
- Community dispensed GP-prescribed drugs for alcohol misuse cost an estimated £0.9 million.
- Laboratory tests for alcohol misuse cost an estimated £0.2 million;
- It is estimated that there were between 71,319 and 276,282 non-psychiatric inpatient bed days attributable to alcohol misuse, resulting in an estimated cost of between £34.3 million and £132.8 million, with a mid-point of £83.5 million.
- It was estimated that there were between 103,788 and 125,773 psychiatric inpatient bed days attributable to alcohol misuse, resulting in an estimated cost of between £32.8 million and £39.7 million, with a mid-point of £36.2 million.
- It was estimated that there were between 10 and 20 maternity inpatient bed days attributable to alcohol misuse, resulting in an estimated cost of between £16,000 and £31,000, with a mid-point of £23,000.
- There were between 30,186 and 603,730 accident and emergency attendances attributable to alcohol misuse, resulting in an estimated cost of between £3.8 million and £55.9 million, with a mid-point of £29.0 million.
- It was estimated that there were between 105,673 and 282,843 outpatient attendances attributable to alcohol misuse, resulting in an estimated cost of between £11.4 million and £30.4 million, with a mid-point of £20.9 million.
- It was estimated that there were between 6,626 and 17,736 hospital day cases attributable to alcohol misuse, resulting in an estimated cost of between £0.9 million and £2.5 million, with a mid-point of £1.7 million.
- It was estimated that there were between 5,841 and 204,438 ambulance journeys attributable to alcohol misuse, resulting in an estimated cost of between £1.4 million and £47.5 million, with a mid-point of £24.4 million.
- The cost of alcohol services is estimated to be between £40.5 million and £64.0 million, with a mid-point of £52.3 million
- The overall health care costs are estimated to be between £143.6 million and £392.8, with a mid-point £267.8 million.

Introduction

5.1 This section presents the methodology used to estimate the annual level of health care resource use attributable to alcohol misuse and the corresponding cost to NHS Scotland in the financial year 2007/08. In particular, the section covers:

- GP and Practice Nurse consultations;
- Community psychiatric team contacts;
- Community dispensed drugs;
- Laboratory tests;
- Hospitalisations;
- Accident and Emergency attendances;
- Outpatient attendances;
- Day hospital attendances;
- Ambulance journeys;
- Alcohol services.

5.2 The unit costs used in the analyses (and their sources) can be found in Appendix C (Table C.1).

5.3 Within this section the health conditions are divided into two main categories:

- **Wholly attributable alcohol conditions** - those conditions where alcohol is implicated in all cases of the condition; for example, alcohol-induced behavioural disorders and alcoholic liver cirrhosis. No cases would be expected to arise in the absence of alcohol.
- **Partly attributable alcohol conditions** - where alcohol is causally implicated in a proportion, but not all cases of the condition, (e.g. breast cancer and hypertensive diseases).

5.4 It should also be noted that each hospital discharge can include up to six diagnoses. The diagnosis / condition which appears first in the discharge record is known as the underlying or primary diagnosis, while conditions in any other position are supplementary diagnoses but are considered to have contributed to the hospitalisation. Attributing the entire cost of an episode to alcohol misuse when the alcohol-related diagnosis is not the primary diagnosis may lead to an over estimate, but ignoring the entire cost of these episodes may lead to an under estimate. Lower and upper cost estimates have been generated using figures for the number of hospital episodes that relate to an alcohol-related diagnoses being the primary diagnosis and for it being in any position respectively.

GP and Practice Nurse (PN) Consultations

5.5 The cost of GP and PN consultations has been estimated for:

- Consultations arising from diagnoses/conditions that are wholly attributable to alcohol misuse;
- Consultations arising from diagnoses/conditions that are partially attributable to alcohol misuse.

5.6 The Practice Team Information (PTI) database holds information from a sample of Scottish general practices about face-to-face consultations (in a surgery or the patient's home) between patients and a member of the practice team[7].

GP and PN consultations wholly attributable to alcohol misuse

5.7 The numbers of consultations with GPs and Practice Nurses (PN) in 2007/08 where the primary diagnosis was wholly attributable to alcohol misuse were obtained from the PTI database. The Read codes included in this analysis can be found in Appendix C (Table C.2).

5.8 It is estimated that a total of 109,594 GP and Practice Nurse consultations were wholly attributable to alcohol misuse in 2007/08[8]. At an average cost of £32 per GP or PN consultation, it is estimated that consultations wholly attributable to alcohol misuse result in a cost of £3,507,008.

GP and PN consultations partially attributable to alcohol misuse

5.9 PTI data was also used to estimate of the number of GP and PN consultations for conditions partially attributable to alcohol misuse (e.g. some cancers; injuries) where these conditions were the primary diagnosis. Scottish-specific alcohol population attributable fractions (PAFs)[9] have been estimated by ICD10 code but the PTI database uses Read Codes. Therefore the first step was to map the relevant ICD10 codes to the Read Codes. The proportions of consultations attributable to alcohol misuse were then calculated by applying the PAFs to the total numbers of consultations for each condition. Using this approach a total of 361,158 consultations were estimated to be attributable to alcohol misuse, resulting in a total cost of £11,557,053. The estimated number of consultations for conditions that are partially attributable to alcohol misuse are presented in Appendix C (Table C.3).

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7 See http://www.isdscotland.org/isd/1044.html for further information.

8 This figure is lower than the 2006/07 estimate published by ISD Scotland in *Alcohol Statistics 2009* (Information Services Division, 2009). This is partly due to changes in the ISD methodology for calculating PTI data (see http://www.isdscotland.org/isd/5923.html for further information) resulting in a decrease in the number of reported consultations.

9 Source: ISD Scotland. *Alcohol attributable mortality and morbidity: alcohol population attributable fractions for Scotland.* June 2009. These fractions have been calculated by combining relative risks of having a condition for different categories of drinkers, combined with the percentage of the Scottish population falling within those categories. This produces an estimate of the proportion of disease burden that is attributable to alcohol consumption for each condition.

Community Psychiatric Team Contacts

5.10 The amount of Community Psychiatric Team (CPT) contact in Scotland attributable to alcohol misuse is not available. The annual cost of community psychiatric teams in 2007/08 is estimated at £143,218,000[10]. One method for estimating the alcohol-attributable portion of this cost is to take an average of the percentages of primary and secondary care resource use that are attributable to alcohol[11]. The percentage of GP consultations attributable to alcohol misuse is calculated by dividing the number of direct and indirect consultations attributable to alcohol (figures retrieved from PTI data[7]) by the total number of consultations in 2007/08[12], and is estimated to be 2.2%. The percentage of inpatient episodes attributable to alcohol is estimated using the same methodology (figures retrieved from SMR01 data[13], primary diagnosis only) and is estimated to be 2.5%. The alcohol-attributable percentage of expenditure on community psychiatric teams is estimated using the median of the GP and the inpatient percentages (i.e. 2.4%).

5.11 Using this method it is estimated that 2.4% of CPT costs in 2007/08 were directly attributable to alcohol misuse, indicating a total cost of £3,365,623[14].

5.12 An alternative method of calculating the number of CPT visits attributable to alcohol misuse is to multiply the number of visits per high-risk drinker per year by the number of people in the high-risk drinking category[15]. The number of high-risk drinkers[16] in Scotland was estimated by combining General Register Office for Scotland 2007 population estimates (see Table 2.1) with the percentage of males and females in the high-risk drinking category[17] from the Scottish Health Survey 2008. An estimate of the number of CPT visits per high-risk drinker per year in Scotland is not available. However, estimates from the Birmingham Untreated Heavy Drinkers Project (Dalton et al., 2004) were applied to the estimated number of high-risk drinkers.

5.13 Using this method it is estimated that 24,914 Community Psychiatric Nurse (CPN) visits were attributable to alcohol misuse in 2007/08 with an associated cost of £3,909,554.

5.14 Thus, it is estimated that CPT cost in relation to alcohol misuse is between £3,365,623 and £3,909,554.

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10 ISD Scotland. Community Services: Summary of Service Provision 2007/08. Available from http://www.isdscotland.org/isd/servlet/FileBuffer?namedFile=Costs_R500_2008.xls&pContentDispositionType=inline

11 This is the method previously used to estimate the CPT cost in relation to alcohol misuse in Scotland (Scottish Government, 2008a).

12 http://www.isdscotland.org/isd/3678.html.

13 See http://www.isdscotland.org/isd/4334.html for further information.

14 If diagnosis in any position is used to calculate the percentage (rather than primary diagnosis only), this figure increases to £9,008,412.

15 This method has previously been used by the Cabinet Office (Cabinet Office, 2003).

16 High-risk is defined as >50 units per week for males and >35 units per week for females.

17 7% for males and 4% for females.

Community Dispensed Drugs

5.15 The cost of community dispensed drugs used to treat alcohol dependence was calculated from NHS Scotland Prescription Cost Analysis data for the financial year 2007/08[18]. It is assumed that 100% of the cost of Acamprosate Calcium and Disulfiram is attributable to alcohol misuse, as these drugs are only prescribed for alcohol dependence[19]. Naltrexone Hydrochloride is used to treat dependence on alcohol and other drugs. The proportion of Naltrexone Hydrochloride prescriptions that are for alcohol dependence is not available; therefore, it is assumed that 50% of the cost of Naltrexone Hydrochloride is used to treat alcohol dependence (with the remaining prescription cost being for dependence on other drugs). Under these assumptions the cost of Acamprosate Calcium, Disulfiram and Naltexone Hydorchloride is £866,125.

5.16 Benzodiazepines such as chlordiazepoxide can be used in the treatment of alcohol withdrawal syndrome. However, as benzodiazepines are used for a number of conditions (including anxiety, insomnia, and seizures) it has not been possible to estimate the percentage of the cost of these drugs that are attributable to alcohol misuse. As an indication, if 5% of benzodiazepines were prescribed for alcohol misuse, this would result in an additional drug cost of £388,313. This would rise to £776,626 and £1,941,566 if 10% and 25% of benzodiazepines were prescribed for alcohol misuse, respectively[20].

5.17 The estimated annual cost of community dispensed drugs attributable to alcohol misuse in 2007/08 is £866,125. As mentioned above, this is likely to be an under estimate of the true alcohol-attributable community dispensed drug costs due to the omission of benzodiazepines.

Laboratory Tests

5.18 It was reported by Schwan *et al.* (Schwan *et al*., 2004) that in French primary care a biochemistry test (gamma-glutamyl transferase, GGT) and a haematology test (mean corpuscular volume, MCV) are used as first-line tests when alcohol misuse is suspected. It is unknown whether this is standard practice in Scotland. However, an arbitrary assumption is made that 25% of patients consulting with a GP or PN because of an alcohol misuse problem would undergo blood and biochemistry tests at the same time. Using this approach it is estimated that 27,399 haematology tests and 27,399 biochemistry tests were attributable to alcohol misuse in 2007/08.

5.19 It is also assumed, as in a previous cost of alcohol misuse study (Scottish Government, 2008a), that individuals having GP or PN consultations indirectly related to alcohol misuse (i.e. with conditions that are partly attributable to

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[18] See http://www.isdscotland.org/isd/information-and-statistics.jsp?pContentID=2241&p_applic=CCC&p_service=Content.show& for further information.

[19] See, for example, http://www.nlm.nih.gov/medlineplus/

[20] Source: http://www.isdscotland.org/isd/information-and-statistics.jsp?pContentID=2241&p_applic=CCC&p_service=Content.show&
Estimates include the costs of chlordiazepoxide, clonazepam, diazepam, loprazolam, lorazepam, lormetazepam, midazolam, nitrazepam, oxazepam, and temazepam.

alcohol misuse) may undergo laboratory tests, but that these would not necessarily be as a result of alcohol misuse. Consequently, it has been assumed that costs of tests for these individuals are not necessarily attributable to alcohol misuse and they have therefore not been included in the analysis.

5.20 The costs of tests and procedures attributable to alcohol misuse that are undertaken in secondary care have been included as part of the cost of hospitalisation and therefore are not included separately here.

5.21 The unit costs of haematology (£5.88) and clinical chemistry (£0.87) tests in 2007/08 were identified from the ISD Scotland Costs Book[21]. Using these figures the annual cost of alcohol-related laboratory tests in 2007/08 is estimated to be £184,943.

Hospital Costs

Hospitalisations wholly attributable to alcohol misuse

5.22 Inpatient costs wholly attributable to alcohol have been estimated for:

- Non-psychiatric inpatients;
- Psychiatric inpatients;
- Maternity inpatients.

5.23 Cost estimates are presented in two ways, firstly for episodes with an alcohol-related primary diagnosis, and secondly for episodes with an alcohol-related diagnosis in any position.

5.24 Hospitalisation data were obtained from the inpatient databases (SMR01[13] for non-psychiatric, SMR04[22] for psychiatric, and SMR02[23] for maternal) held by the ISD Scotland, which consist of data from all Scottish Health Boards. Where possible, data were obtained for the annual number of inpatient episodes (measured by the number of discharges) and bed days.

5.25 Data on non-psychiatric discharges in 2007/08 where the primary diagnosis or diagnosis in any position is wholly attributable to alcohol were provided by ISD Scotland by ICD10 code (see Appendix C (Table C.4) for a list of codes used in the analysis). Psychiatric discharge data for 2007/08 where the primary diagnosis or diagnosis in any position was wholly attributable to alcohol misuse were also provided by these ICD10 codes.

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21 See http://www.isdscotland.org/isd/3632.html for further information.

22 See http://www.isdscotland.org/isd/information-and-statistics.jsp?pContentID=1220&p_applic=CCC&p_service=Content.show& for further information.

23 See http://www.isdscotland.org/isd/1019.html for further information.

Episodes with a primary diagnosis wholly attributable to alcohol misuse

5.26 It is estimated that a total of 10,679 non-psychiatric hospital episodes were wholly attributable to alcohol misuse (i.e. with a primary diagnosis attributable to alcohol). At a cost per bed day of £480.56, this resulted in 42,047 bed days at a total cost of £20,206,106.

5.27 For psychiatric patients, it is estimated that a total of 3,254 inpatient episodes were wholly attributable to alcohol misuse, and these resulted in a total of 103,788 bed days. At a cost of £315.57 per bed day the estimated total cost of psychiatric inpatient episodes is £32,752,379.

5.28 It is estimated that there were 10 maternity inpatient episodes that were wholly attributable to alcohol[24] in 2006. As more recent data are not available it is assumed that the same number of episodes occurred in the year 2007/08. At a cost of £1,549 per episode, these resulted in an estimated cost of £15,490. Tables 5.1 and 5.2 present the results of the analysis of hospitalisations by diagnosis.

Table 5.1: Number of non-psychiatric hospital episodes and bed days wholly attributable to alcohol misuse 2007/08 (by primary diagnosis only)

	Non-psychiatric		
Diagnosis	**Number of episodes 2007/08**	**Number of bed days 2007/08**	**Cost 2007/09**
Mental & Behavioural Disorders	6,374	20,116	£9,666,945
Alcohol Liver Disease	2,944	17,486	£8,403,072
Alcoholic gastritis	625	1,324	£636,261
Alcohol-induced chronic pancreatitis	442	1,745	£838,577
Toxic Effect of Ethanol	130	127	£61,031
Other Alcohol Diagnosis	164	1,249	£600,219
TOTAL	**10,679**	**42,047**	**£20,206,106**

Source: SMR01, ISD Scotland.

[24] These comprised episodes with a diagnosis of foetal alcohol syndrome, maternal care for suspected damage to the foetus from alcohol, and foetus and newborn affected by maternal use of alcohol.

Table 5.2: Number of psychiatric hospital episodes and bed days wholly attributable to alcohol misuse 2007/08 (by primary diagnosis only)

	Psychiatric		
	Number of episodes 2007/08	**Number of bed days 2007/08**	**Cost 2007/08**
Acute intoxication	51	436	£137,589
Harmful use	448	9,100	£2,871,687
Dependence syndrome	2,422	33,849	£10,681,729
Withdrawal state	53	666	£210,170
Withdrawal state with delirium	28	354	£111,712
Psychotic disorder	97	1,832	£578,124
Amnesic syndrome	100	38,797	£12,243,169
Residual and late-onset psychotic disorder	40	16,456	£5,193,020
Other mental and behavioural disorders	2	876	£276,439
Unspecified mental and behavioural disorders	13	1,422	£448,741
TOTAL	**3,254**	**103,788**	**£32,752,379**

Source: SMR04 data, ISD Scotland.

Episodes with a diagnosis in any position that is wholly attributable to alcohol misuse

5.29 It is estimated that a total of 42,639 non-psychiatric hospital episodes were related to alcohol misuse (i.e. with an alcohol-attributable diagnosis in the primary or any position) in 2007/08. At a cost per bed day of £480.56, these resulted in 128,490 bed days at a total cost of £61,747,154.

5.30 For psychiatric patients, it is estimated that a total of 3,901 inpatient episodes were related to alcohol misuse (at a cost of £315.57 per bed day), resulting in a total of 125,773 bed days, at a total cost of £39,690,186.

5.31 There were estimated to be 20 maternity inpatient episodes that were related to alcohol[24] (at a cost of £1,549 per episode) and these resulted in an estimated cost of £30,980. Tables 5.3 - 5.4 present the results of the analysis of hospitalisations by diagnosis.

Table 5.3: Number of non-psychiatric hospital episodes and bed days wholly attributable to alcohol misuse 2007/08 (by diagnosis, in any position)[1]

Diagnosis	Non-psychiatric		
	Number of episodes 2007/08	Number of bed days 2007/08	Cost 2007/08
Mental & Behavioural Disorders	27289	80,197	£38,539,470
Alcohol Liver Disease	6110	30,703	£14,754,634
Accidental Poisoning	16	14	£6,728
Intentional Poisoning	20	18	£8,650
Poisoning by Exposure	*	*	*
Evidence of Alcohol - Blood Level	26	33	£15,858
Evidence of Alcohol - Level of Intoxication	451	818	£393,098
Alcohol Induced Pseudo-Cushings	*	*	*
Wernickes Encephalopathy	42	239	£114,854
Degeneration of the nervous system due to alcohol	81	1,067	£512,758
Alcoholic Polyneuropathy	19	82	£39,406
Alcoholic Myopathy	*	42	£20,184
Alcoholic cardiomyopathy	105	468	£224,902
Alcoholic gastritis	709	1,575	£756,882
Alcohol-induced chronic pancreatitis	645	2,520	£1,211,011
Maternal Care	-	-	-
Foetus & Newborn affected	-	-	-
Fetal Alcohol Syndrome	18	57	£27,392
Toxic Effect of Ethanol	4266	3,214	£1,544,520
Toxic Effect of Methanol	*	*	*
Toxic Effect of Alcohol NOS	381	298	£143,207
Alcohol Deterrents	*	*	*
Finding alcohol in blood	22	45	£21,625
Alcohol Rehabilitation	33	381	£183,093
Alcohol Abuse Counselling	25	74	£35,561
Alcohol Use	2360	6,645	£3,193,321
Unknown	21	-	-
TOTAL	**42,639**	**128,490**	**£61,747,154**

1 '-' indicates zero and '*' indicates values that have been suppressed due to the potential risk of disclosure

Source: SMR01, ISD Scotland.

Table 5.4: Number of psychiatric hospital episodes and bed days wholly attributable to alcohol misuse 2007/08 (by diagnosis, in any position)

	Psychiatric		
	Number of episodes 2007/08	**Number of bed days 2007/08**	**Cost 2007/08**
Acute intoxication	74	692	£218,374
Harmful use	777	22,534	£7,111,054
Dependence syndrome	2,675	39,406	£12,435,351
Withdrawal state	63	1,008	£318,095
Withdrawal state with delirium	28	354	£111,712
Psychotic disorder	106	2,028	£639,976
Amnesic syndrome	114	40,629	£12,821,294
Residual and late-onset psychotic disorder	43	16,768	£5,291,478
Other mental and behavioural disorders	2	876	£276,439
Unspecified mental and behavioural disorders	19	1,478	£466,412
TOTAL	**3901**	**125773**	**£39,690,186**

Source: SMR04 data, ISD Scotland.

Hospitalisations due to conditions that are partially attributable to alcohol misuse

5.32 The number of inpatient episodes was obtained from the SMR01 database for conditions partially attributable to alcohol misuse (e.g. some cancers; injuries) where these conditions were the primary diagnosis or a diagnosis in any position were provided by ISD Scotland by ICD10 code. The proportion of episodes attributable to alcohol misuse was calculated by applying current alcohol population attributable fractions (PAFs) to the total numbers of episodes (see footnote 9).

5.33 Using primary diagnosis only, a total of 5,057 episodes were estimated to be indirectly attributable to alcohol misuse in 2007/08, resulting in 29,272 bed days at a total cost of £14,067,092. The estimated number of episodes and bed days for each condition can be found in Appendix C (Table C.5).

5.34 Using diagnosis in any position, a total of 31,080 episodes were estimated to be indirectly attributable to alcohol misuse, resulting in 147,792 bed days at a total cost of £71,022,707. The estimated number of episodes and bed days for each condition can be found in Appendix C (Table C.6).

5.35 Data on psychiatric inpatient episodes that are partially attributable to alcohol misuse have not been included in the cost estimate. This may, therefore, lead to an underestimate of inpatient cost.

Accident and Emergency Attendances

5.36 The total number of emergency attendances in 2007/08 across all of Scotland was obtained from A&E Data Mart data held by ISD Scotland[25]. The number of attendances at accident and emergency (A&E) departments in Scotland attributable to alcohol misuse is not available. The Scottish Emergency Department Alcohol Audit (SEDAA) reported that alcohol was a contributory factor in 11% of A&E attendances over ten days in Scotland in 2005 (Quality Improvement Scotland, 2006). This is at the lower end of the range of values suggested by a UK review in this area (Charalambous, 2002). This review estimates that between 2% and 40% of all A&E attendances are due to alcohol-related problems. A more recent estimate of the percentage of A&E attendances in the UK attributable to alcohol was reported as 2.9% (Durnford *et al.*, 2008), and this also falls at the low end of the estimated range. Previous national COI studies have used higher figures than the SEDAA and Durnford *et al.* estimates (35% in England (Department of Health, 2008)) and 25% in Scotland (Scottish Government, 2008a).

5.37 On the basis of published figures, between 30,186 and 603,730 A&E attendances may be attributable to alcohol misuse. Using a cost of £92.54 per attendance (identified from the Scottish Health Service Costs Book) the cost of these attendances is between £2,793,457 and £55,869,137.

Table 5.5: A&E Attendances

Reference	Percentage of A&E attendances that are alcohol-related	Number of attendances	Cost of A&E attendances
Charalambous, 2002	2%	30,186	£2,793,457
Durnford et al., 2008	2.9%	43,770	£4,050,512
Quality Improvement Scotland, 2006	11%	166,026	£15,364,013
Scottish Government, 2008a	25%	377,331	£34,918,211
Department of Health, 2008	35%	528,263	£48,885,495
Charalambous, 2002	40%	603,730	£55,869,137

[25] See http://www.isdscotland.org/isd/4024.html for further details.

Outpatient Attendances

5.38 The number of outpatient attendances in Scotland attributable to alcohol misuse is not available. The total number of outpatient attendances in 2007/08 across all of Scotland was obtained from SMR00 data held by ISD Scotland[26]. The total number of outpatient episodes excluding A&E was used to avoid double counting A&E attendances (see paragraphs 5.32 to 5.33 for A&E estimates)[27].

5.39 It is estimated that 2.2% of GP consultations were attributable to alcohol misuse and that 2.5% of inpatient hospitalisations were attributable to alcohol misuse (primary diagnosis only, see paragraph 5.7). Using a methodology previously employed in a cost of alcohol misuse study (Scottish Government, 2008a), the alcohol-attributable percentage of outpatient attendances is assumed to be the mid-point between the GP and the inpatient percentages (i.e. 2.4%). This percentage was applied to the total number of outpatient attendances in 2007/08 to provide the number of attendances attributable to alcohol misuse.

5.40 To derive an upper and lower bound for the estimated cost of outpatient attendances costs were estimated in relation to primary diagnoses and diagnosis in any position respectively. Based on primary diagnosis, it was estimated that there were 105,673 outpatient episodes. At a cost of £107.58 per attendance this results in an estimated cost of £11,368,301. If diagnosis in any position is used the number of episodes increases to 282,843 and the cost estimate increases to £30,428,250.

Day Hospital Attendances

5.41 The number of day hospital attendances in Scotland attributable to alcohol misuse is not available. The total number of day hospital attendances for general and old age psychiatric patients in 2007/08 was obtained from ISD(S)1 data held by ISD Scotland[28].

5.42 Using the methodology outlined in paragraph 5.7 (previously used by Scottish Government, 2008) it is estimated that 2.4% of the total number of day hospital attendances in 2007/08 were attributable to alcohol misuse (primary diagnosis only).

5.43 It is estimated that a total of 6,626 psychiatric day hospital attendances were directly attributable to alcohol misuse in 2007/08. This resulted in a total cost of £925,942. If diagnosis in any position is used to calculate the percentage (rather than primary diagnosis only), this figure increases to £2,478,373.

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[26] See http://www.isdscotland.org/isd/4156.html for further details.

[27] Previous methodology used by the Department of Health (Department of Health, 2008) included outpatient and A&E attendances (taken from the General Household Survey). To use such an approach here would result in double counting.

[28] See http://www.isdscotland.org/isd/4159.html for further details.

Ambulance Journeys

5.44 The proportion of ambulance transportation in Scotland attributable to alcohol misuse is not available. The total number of ambulance responses in Scotland in 2007/08 was obtained from data collected and published by ISD Scotland in *Costs Book*[29]. The percentage of these ambulance journeys that are attributable to alcohol misuse is uncertain. Previous UK COI studies of alcohol misuse have estimated that 35% of ambulance journeys in England (Department of Health, 2008) and 25% of ambulance journeys in Scotland (Scottish Government, 2008a) are attributable to alcohol. A COI study in Lanarkshire used a range of 1 - 20% to estimate the number of alcohol-related ambulance journeys (Brown *et* al., 2001). The London Ambulance Service reports that alcohol-related calls now make up more than 6% of their workload[30]. A retrospective analysis of data from Glasgow Royal Infirmary found that 21.8% of ambulance arrivals were acutely intoxicated (Vardy *et* al., 2009).

5.45 On the basis of published figures, between 5,841 and 204,438 ambulance journeys may be attributable to alcohol misuse. Using a cost of £232.29 per journey (identified from the Scottish Health Service Costs Book) the cost of these journeys is between £1,356,824 and £47,488,857 (see Table 5.6).

Table 5.6: Ambulance journeys

Source	Percent of journeys	Number of journeys	Cost
Brown et al., 2001	1.0%	5,841	£1,356,824
London Ambulance Service	6.0%	35,046	£8,140,947
Brown et al., 2001	20.0%	116,822	£27,136,489
Vardy et al., 2009	21.8%	127,336	£29,578,774
Scottish Government, 2008a	25.0%	146,027	£33,920,612
Department of Health,2008	35.0%	204,438	£47,488,857

Alcohol Services

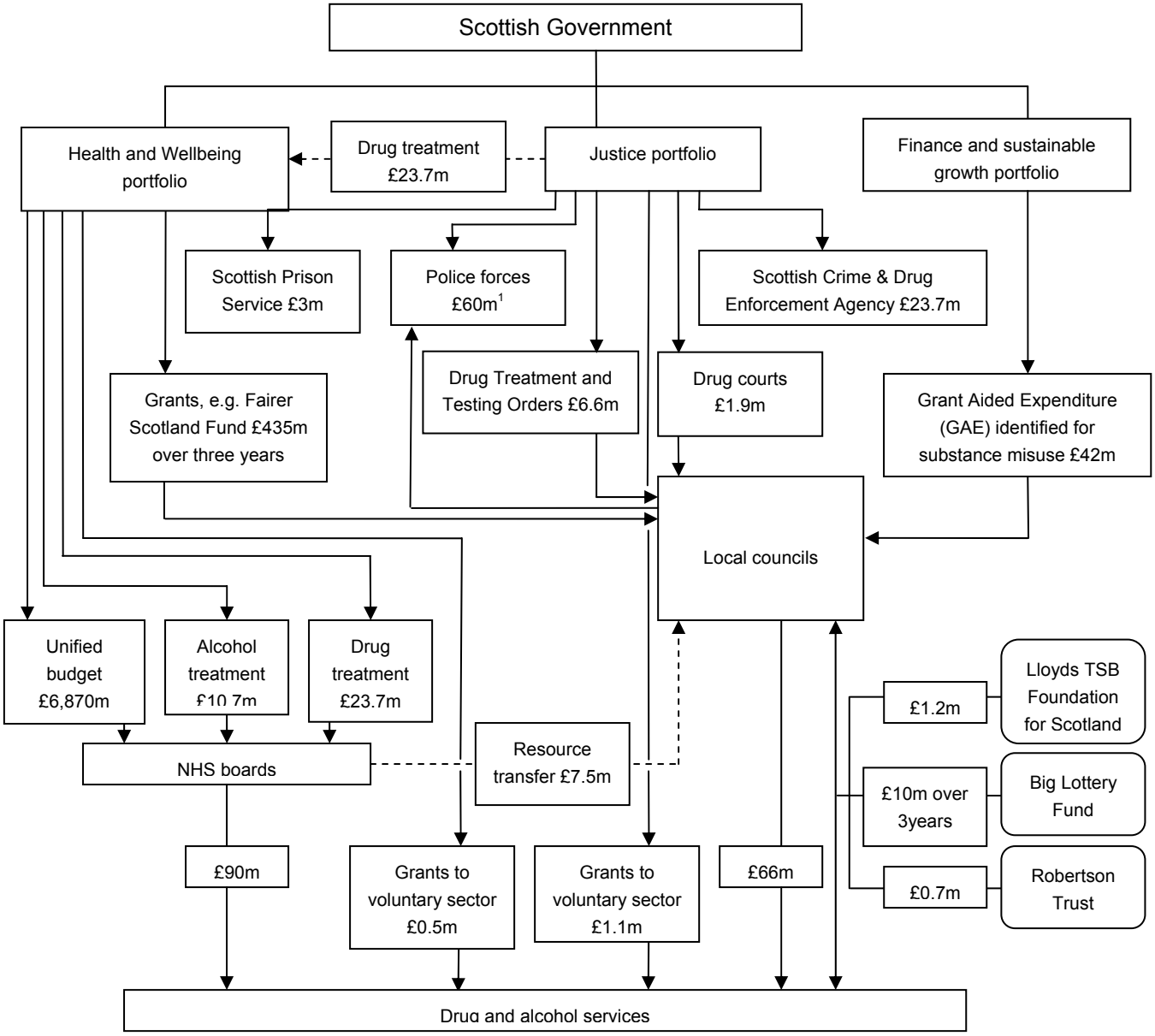
5.46 The funding mechanism for alcohol services is complex. Services may be run by public sector, private sector or voluntary organisations and their funding comes from a range of sources[31]. Additionally, funding may be directed through several different agencies before it reaches the actual service and many services receive funding from multiple bodies. Figure 5.1 shows the main funding streams for drug and alcohol services in 2007/08.

[29] See Table R910 at http://www.isdscotland.org/isd/costs-overview.jsp?pContentID=3726&p_applic=CCC&p_service=Content.show& for further information.

[30] http://www.londonambulance.nhs.uk/news/alcohol-related_calls.aspx

[31] Sources include NHS ring-fenced allocations, NHS unified budgets, council general allocations, specific grant funding, the voluntary sector, the police, the Scottish Prison Service.

Figure 5.1: Main funding streams for drug and alcohol services 2007/08



Note 1. Scottish Government estimate of police spend on drug-related crime.

Source: Audit Scotland, 2009

Expenditure on Alcohol Services by NHS boards and Councils

5.47 In March 2009 Audit Scotland published a report detailing findings from a study to identify how much the public sector spends on 'labelled' drug and alcohol services (Audit Scotland, 2009). The study also included an assessment of whether services were evidence based and what impact the money has had.

5.48 In the absence of definitive national data on expenditure on drug and alcohol services, Audit Scotland collected information from all NHS boards and councils on how much these bodies spent directly on drug and alcohol services in 2007/08. Some bodies found it difficult to provide accurate estimates of expenditure for a number of reasons including differences in the way that budgets are recorded in each locality and difficulties in disaggregating expenditure on drug and alcohol services from other related health and social services.

5.49 The study estimated that in 2007/08 the NHS boards spent £90 million and Councils spent £66 million (including £7.5 million transferred to them from NHS boards) on direct drug and alcohol services. Of this, £25.9 million was attributable to alcohol-specific services, £52.9 million was attributable to combined drug and alcohol services and £77.0 million was on direct drug services.

5.50 Figures in the report show that the percentage of NHS and council expenditure that is alcohol- specific varies widely across Scotland from 29% in Shetland to 4% in Dumfries and Galloway. Overall, a sixth (16.6%) of expenditure is on dedicated alcohol services. However, it is reported that in many cases the costs allocated to joint drug and alcohol services were provided and it was not possible to disaggregate the costs specifically allocated to alcohol services.

5.51 Two scenarios were used to estimate the proportion of combined drug and alcohol expenditure that is attributable to alcohol services, namely:

- Audit Scotland report that across Scotland, NHS boards and councils spend about three times more on drug services than alcohol services. Based on this, we estimate that approximately 25% of the combined expenditure on drug and alcohol services is attributable to alcohol services;
- More crudely, we assume that half of combined expenditure may be attributed to alcohol services.

5.52 Estimates of expenditure on combined alcohol and drug services under these assumptions are displayed in Table 5.7. Estimates of the total expenditure on alcohol services, combining expenditure specifically on alcohol services (£25.9 million) plus the proportion of expenditure on drug and alcohol services attributable to alcohol, are also displayed in Table 5.7.

Table 5.7: Estimates of NHS board and council spend on alcohol services

Proportion of combined alcohol and drug service expenditure that may be attributed to alcohol services	Estimated expenditure on combined alcohol and drug services attributed to alcohol misuse	Estimated total expenditure on alcohol services[1]
	£ (million)	£ (million)
25.0%	13.2	39.1
50.0%	26.5	52.4

1 Money spent specifically on alcohol services plus the estimated spend on combined alcohol and drug services that is attributed to alcohol services

5.53 Based on the assumption that alcohol services make up between 25% and 50% of the total expenditure on combined drug and alcohol services, the estimated expenditure on alcohol-related services in 2007/08 is between £39.1 million and £52.4 million.

5.54 The higher estimate is in line with figures presented in the *Scottish Alcohol Needs Assessment* (Drummond *et al.*, 2009). Researchers involved with compiling the needs assessment asked agencies to give details of the levels of funding they receive for specialist alcohol treatment services. Agencies were also asked to estimate the proportion of joint alcohol and drug expenditure allocated to services for alcohol. This survey resulted in an estimated annual expenditure on alcohol services of £61 million per annum[32] (£51 million for community services and £10 million for residential services).

5.55 Thus estimated expenditure on alcohol-related services is between £39.1 and £61 million.

Other sources of funding for alcohol services

5.56 The voluntary sector provides many drug and alcohol services. The *Drug and Alcohol Services in Scotland* report (Audit Scotland, 2009) provides data to show that, in 2007/08, Lloyds TSB Foundation for Scotland (in partnership with the Scottish Government) provided approximately £1.2 million for drug and alcohol services and that the Robertson Trust contributed an additional £730,000.

5.57 The Audit Scotland report (Audit Scotland, 2009) also states that, in 2007/08, Scottish Government direct expenditure[33] on drug and alcohol services (e.g. research) was £4 million[34].

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32 This estimate includes all sources of funding (e.g. NHS donations etc).

33 Scottish Government allocated in the region of £38 million to drugs and alcohol services in 2007/08. This was routed through the Health Boards and so is included in the Health Board figures. The funding considered in this paragraph is additional direct spending.

34 The Drug and Alcohol Services in Scotland report (Audit Scotland, 2009) also states that, in 2007/08, Police forces spent £10 million and the Scottish Prison Service £3 million on drug and alcohol services. It is not clear whether these costs are included in the criminal justice costs (see

5.58 The proportion of these funds attributable to alcohol services has been calculated using the same approach adopted in earlier sections (see paragraph 6.5 and Table 6.2). Under these assumptions between £0.5 million and £1 million was spent by the voluntary sector and between £1.0 million and £2.0 million was spent by the Scottish Government on alcohol services (see Table 5.8).

Table 5.8: Estimates of Government direct spend on alcohol (e.g. research)

Proportion of Government alcohol and drug expenditure that may be attributed to alcohol	Voluntary sector £ (million)	Scottish Government £ (million)
25.0%	£0.5	£1.0
50.0%	£1.0	£2.0

Limitations and Summary of Costs

5.59 The methodology reported here for identifying the costs of alcohol misuse to the Scottish health care system is subject to several limitations. All reported results should be considered as estimates.

5.60 The majority of resource use data were obtained from ISD Scotland. There are a number of limitations in the methods used by ISD Scotland to collect resource use data, for example PTI data are based on a small sample of practices. Limitations relating to ISD Scotland data can be found on the relevant sections of their website[35].

5.61 Another limitation relating to ISD Scotland data is that it is often not possible to calculate the exact costs attributable to alcohol misuse. For example, inpatient episodes are recorded by diagnosis position, and have been presented here either by main diagnosis only, or by diagnosis in any position. Attributing the entire cost of an episode to alcohol misuse if the alcohol-related diagnosis is not the primary diagnosis may lead to an over estimate. However, it may be an under-estimation to ignore the entire cost of these episodes.

5.62 PTI data is only collected from a sample of 47 practices and it is recognised that for some conditions practices (or indeed individuals within practices) may not record diagnoses/conditions with any degree of consistency. Additionally, the PTI database stores information on diagnosis/condition using Read Codes which do not map directly to ICD10 codes.

5.63 Where it was not possible to identify alcohol-attributable resource use directly from ISD Scotland data, estimates have been made based on information in published literature (i.e. for A&E attendances and for ambulance journeys). There is a great deal of variation in the published figures. Additionally, generalisability to the whole Scottish health care setting is unclear.

Section 8) and therefore, to avoid the risk of double counting, they have not been included in this section.

[35] http://www.isdscotland.org/isd/CCC_FirstPage.jsp

5.64 For some factors (e.g. CPT, outpatient visits) alcohol-attributable resource was not available from ISD Scotland and was also not identified in published literature. For these factors, methods used in previous COI studies of alcohol misuse were used to estimate the proportion of total resource use that is attributable for alcohol misuse. These methods involve several assumptions, and differing methodologies produce differing estimates of resource use. Where appropriate, the results from more than one approach have been presented.

5.65 For other factors, standard clinical practice in Scotland is unknown leading to the use of arbitrary assumptions to make estimates. In particular, the frequency of laboratory tests in primary care to investigate alcohol-related health problems and the proportion of benzodiazepines prescribed for alcohol misuse are unknown (costs for the latter have not been included).

5.66 Attempts to disaggregate the complex funding mechanisms associated with drug and alcohol services inevitably leads to difficulties in estimating expenditure that is attributable to services that relate only to alcohol. Furthermore, differences in the methods used to collate the source information in relation to the cost of alcohol services vary, meaning that the findings from different sources may not be directly comparable.

5.67 Given these difficulties, some caution should be taken in interpreting the estimates in relation to alcohol services. However, every effort has been taken to ensure that the derivation of the estimates is transparent and that ranges are presented where there is uncertainty.

5.68 The findings for this section are summarised in Table 5.9, which shows that the health care costs associated with alcohol misuse are estimated to be in the range of £143.6 - £392.8 million, with a mid-point estimate of £267.8 million.

Table 5.9: Summary of health care costs

Resource category	Cost 2007/08
GP and Practice Nurse consultations	Mid-point: £15.1 million
Community Psychiatric Teams	Mid-point: £3.6 million Range: £3.4 million – £3.9 million
GP Prescribed drugs	£0.9 million
Laboratory tests	£0.2 million
Non-psychiatric inpatient stays	Mid-point: £83.5 million Range: £34.3 million – £132.8 million
Psychiatric inpatient stays	Mid-point: £36.2 million Range: £32.8 million - £39.7 million
Maternity (inpatient)	Mid-point: £23,000 Range: £16,000 – £31,000
A&E attendances	Mid-point: £29.0 million Range: £2.8 million - £55.9 million
Outpatient attendances	Mid-point: £20.9 million Range: £11.4 million - £30.4 million
Hospital day cases	Mid-point: £1.7 million Range: £0.9 million - £2.5 million
Ambulance journeys	Mid-point: £24.4 million Range: £1.4 million – £47.5 million
Alcohol services (public sector and voluntary sector)	Mid-point: £52.3 million Range: £40.6 million – £64.0 million
TOTAL	**Mid-point: £267.8 million** **Range: £143.6 million – £392.8 million**

6 SOCIAL CARE EXPENDITURE

Summary

- The estimated 2007/08 cost of alcohol attributable social care in relation to children and families is between £104.0 million and £312.1 million (with a mid-point of £208.5 million).
- The estimated 2007/08 cost of alcohol attributable criminal justice social work is between £7.0 million and £27.4 million (with a mid-point of £17.2 million)
- The estimated 2007/08 alcohol attributable care home expenditure is between £1.7 million and £3.4 million (with a mid-point of £2.5 million)
- The estimated 2007/08 cost of alcohol attributable referrals to the Children's Hearing System is between £1.6 million and £3.9 million (with a mid-point of £2.7 million).
- In total, the 2007/08 estimated alcohol attributable social care and Children's Hearing System costs lie between £114.2 million and £346.8 million (with a midpoint of £230.5 million).

6.1 This section considers alcohol-related social work costs in relation to children and families, and also in relation to criminal justice social work. Additionally, information is included on expenditure incurred by the Children's Hearing System, Scotland's system of care and justice for children and young people.

Children and Families

6.2 Cost estimates have been made based on the level of social work case load that is due to alcohol misuse. Data on social work expenditure are provided by local authority finance departments to the Scottish Government's Statistical Support for Local Government branch via Local Financial Return Social Work ("LFR3").

6.3 The 2007/08 expenditure on social work relating to children and families (excluding expenditure on the Children's Panel) are presented in Table 6.1.

Table 6.1: Total gross expenditure on social work relating to children and families (excluding Children's Panel)

Type of Expenditure		**£**
General Fund Revenue Expenditure 2007/08	Children and families	£685,515,000
Gross Capital Expenditure	Children	£8,090,000[36]
Total		**£693,605,000**

Source: Scottish Government Local Financial Returns (LFR3) (Annex F & Annex I).

[36] This figure does not include £190,000 funded from revenue.

6.4 There is a lack of published data on the proportion of social work in Scotland that is related to alcohol misuse. Estimates from studies carried out in England suggest that there is considerable variation in social worker load (ranging from 15 – 45%) that is attributable to alcohol (see Appendix D, Table D.1 for further details).

6.5 A study carried out in 2000-2001[37] (Forrester and Harwin, 2006) considered the case files relating to children allocated for long-term social work in four London boroughs over the period of a year. This study found that in 23% of families there were concerns about alcohol or alcohol and drug misuse. This finding supports the findings of a survey carried out by Aberdeen City Council (Aberdeen City Council, 1997) in which it was found that 24% of children's social work had alcohol cited as a factor in referral. (This estimate was used in the 2001 study on the cost of alcohol misuse (Scottish Executive, 2001).)[38].

6.6 Estimates for the total gross expenditure on children's social work associated with alcohol misuse are presented in Table 6.2. Estimates are derived by assuming that between 15% and 45% of social work volume is alcohol-related. An estimate based on an attributable proportion of 24%, as adopted in the 2001 study on the costs of alcohol is also presented for comparative purposes.

Table 6.2: Estimates for expenditure on alcohol-related children and families social care

Assumption in relation to the proportion of children and families social work that is alcohol-related	£
15% of care	£104,040,750
24% of care	£166,465,200
45% of care	£312,122,250

6.7 Expenditure on alcohol-related children and families social care is estimated to be between £104.0 million and £312.1 million.

Criminal Justice Social Work

6.8 The total gross expenditure on social work for adult offenders in 2007/08 was £97,922,000 (Scottish Government, 2009c). It is known that in 2007/08, of all crimes and offences committed with a charge proved, 6,202 received a community service order and 8,751 received a probation order (Scottish Government, 2008c).

6.9 To estimate the number of community service orders and probation orders that are related to alcohol misuse it has been assumed that these orders are evenly distributed between all crimes and offences. Analysis documented in

[37] Although this study was carried out in 2000-2001 it was not published until 2006.

[38] During August 2009 the Association of Directors of Social Work (ADSW) were contacted in relation to this issue but they were not able to highlight any more recent figures or research.

Section 7 suggests that 7.1% of crimes were alcohol-related. Assuming that the same proportion of offences may be alcohol-related it can be estimated that 7.1% of all community service orders (440), probation orders (621) and criminal justice expenditure £6,952,462 is attributable to alcohol.

6.10 On the one hand this estimate may be too high as community service orders do not apply to those under 16 and only apply to a proportion of 16 and 17 year olds. Additionally, criminal justice social work doesn't deal with people who are under 16 years of age. On the other hand, the figure could be considered as low, for example, figures from the Scottish Prison Survey 2008 show that half of those prisoners who completed a questionnaire (49%) reported being drunk at the time of their offence (Scottish Prison Service, 2008a).

6.11 In deriving the cost of alcohol misuse in Scotland in 2001/02 and 2006/07 (Scottish Executive, 2001 and Scottish Government, 2008b) it was estimated, respectively, that 27% and 28% of criminal justice social work is alcohol-related. Under the higher assumption the estimated cost of criminal justice social work in 2007/08 is £27,418,160.

6.12 Thus the estimated cost of alcohol misuse in relation to criminal justice social work lies between £7.0 million and £27.4 million.

Care Homes

6.13 Local Authority Net Revenue Expenditure for 2007-08 on care homes for adults with addictions/substance misuse was £6,755,000 (see Appendix D, Table D2). It is not clear what proportion of this expenditure is related to alcohol misuse. Taking a similar approach to that used to identify the proportion of treatment services that are attributable to alcohol misuse (see Section 5, paragraph 5.51) rather than drug misuse, it can be assumed that between 25% and 50% of care home expenditure for people with addictions/substance misuse is related to alcohol misuse. Under these assumptions the cost of alcohol-related care homes is between £1,688,750 and £3,377,500.

Children's Hearing System

6.14 In 2007/2008 there were a total of 90,167 referrals to the Children's Hearing System (Scottish Children's Reporter Administration, 2008), with 50,314 children being referred and 33,652 children (66.9%) only being referred once.

6.15 Children were referred to the Hearing system under 12 grounds of referral (see Appendix D, Table D.3 for details). 'Misused alcohol or drugs' was given as the grounds of referral for 1,462 children. In 2007/08 14,506 children were

referred on offence grounds, with 669 referrals for possession of drugs[39]. If it is assumed that children referred for substance misuse are only referred once and that all referrals in relation to drug misuse are for possession, then it can be estimated that 793 (i.e.1,462 – 669) children were referred for alcohol misuse.

6.16 In 2007/08 there were 15,143 referrals on the alleged grounds of 'lack of parental care'. Alcohol use on the part of parents is likely to have played a part in a number of these referrals.

6.17 To estimate the costs associated with these episodes we firstly assume that each referral due to lack of parental care relates to one child. Secondly we assume that the level of referrals to the Hearing System on alleged grounds of 'lack of parental care' is directly related to the level of alcohol attributable children and families' social work.

6.18 Using these two assumptions the level of referrals to the Hearing System can be estimated by applying the same estimates used to derive the level of alcohol attributable social care for children and families, i.e. between 15% and 45% of referrals may be attributed to alcohol (see paragraphs 6.4 and 6.5 for details behind these assumptions). Estimates based on these assumptions are displayed in Table 6.3.

6.19 The total expenditure on staff and other operating charges for the Children's Hearing Panel in the year 2007/2008 was £25,678,000 (Scottish Children's Reporter Administration, 2008).

6.20 There were 50,314 children referred in 2007/08. Assuming that expenditure can be apportioned evenly between each child referred, the estimated cost in relation to alcohol misuse lies between £1.6 million and £3.9 million (see Table 6.3).

Table 6.3: Estimated number of referrals to the Hearing System on alcohol-related alleged grounds of 'lack of parental care'

Assumption in relation to level of alcohol-related referrals on the alleged grounds of 'lack of parental care'	Number of children referred on the alleged grounds of 'lack of parental care'	Total number of children referred[1] on alcohol-related grounds	Percent of all referrals that relate to children referred on alcohol-related grounds	Cost
15% of referrals	2,271	3,064	6.1%	£1,563,957
45% of referrals	6,814	7,607	15.1%	£3,882,449

1 This equates to the estimated number of children referred on alleged grounds of 'lack of parental care' plus the number of children referred for alcohol misuse (i.e. 793).

39 Note that the offence of possession is not one of the grounds of referral listed in Table D.3. This information is provided in Table 5 (p32) of the Scottish Hearing System annual report (Scottish Children's Reporter Administration, 2008).

6.21 Alcohol could be a significant contributory factor in all of the grounds for referral to the Children's Hearing System. However, the contribution that alcohol may make in these cases is unknown. Hence, the cost of the Children's Hearing System associated with alcohol misuse may be an underestimate.

Limitations and Summary of Costs

6.22 Attributing the costs of children and families social work to alcohol necessarily involves making some assumptions about particular services. This leads to considerable uncertainty in relation to the resultant estimate for the cost of children and families' social work that may be attributable to alcohol misuse.

6.23 Similarly, in estimating the proportion of expenditure on criminal justice social work and the proportion of Child Hearing System costs that are attributable to alcohol a pro-rata approach was employed and this leads to considerable uncertainty around these estimates.

6.24 Some very pragmatic assumptions have had to be made in relation to estimating the cost of alcohol misuse to the Children's Hearing System. It is possible that alcohol could be a significant contributory factor in all of the grounds for referral to the Hearing System. So the number of referrals used as the basis for estimating this alcohol-related cost could be an underestimate.

6.25 The costs estimated in this section are summarised in Table 6.4.

Table 6.4: Estimated social care costs due to alcohol misuse in 2007

Resource Category	**Cost 2007/08**
Children and families	Mid-point: £208.1 million Range: £104.0 million – £312.1 million
Criminal justice social work	Mid-point:£17.2 million Range: £7.0 million - £27.4 million
Care homes	Mid-point: £2.5 million Range: £1.7 million – £3.4 million
Child's Hearing System	Mid-point: £2.7 million Range: £1.6 million – £3.9 million
TOTAL	**Mid-point: £230.5 million** **Range: £114.2 million - £346.8 million**

7 COST OF CRIME

Summary

- Alcohol-specific offences comprise 'drunkenness' and 'drink driving'. All other crimes and offences that result as a consequence of alcohol misuse are referred to as alcohol-related crimes and offences.
- The estimated cost associated with alcohol-specific offences ('drunkenness' and 'drink driving') is £8.2 million.
- Data limitations mean that a number of crimes that may have been alcohol-related were excluded from the analysis.
- Available crime related alcohol attributable fractions are notably lower than public perceptions of the level of alcohol-specific crime.
- Using available information, it was estimated that there were 303,668 incidents of alcohol-related crime (police recorded and unrecorded).
- The estimated cost in anticipation of alcohol-related crime is between £14.1 million and £28.5 million, with a mid-point of £21.3 million.
- The estimated cost as a consequence of alcohol-specific crime is between £354.0 million and £757.7 million, with a mid-point of £555.8 million.
- The estimated cost to the Criminal Justice System in response to alcohol-specific crime is between £86.2 million and £197.3 million, with a mid-point of £141.8 million.
- The overall estimate for the cost of alcohol-specific offences and alcohol-specific crimes and offences is between £462.5 million and £991.7 million, with a mid-point of £727.1 million.

Outline of Section

7.1 After an introduction that looks at the extent of alcohol-related crime in Scotland this section goes on to consider the costs associated with alcohol-specific offences (i.e. 'drunkenness' and 'drink driving'). It then considers the costs in relation to alcohol-related crimes and offences (i.e. crimes and offences other than alcohol-specific offences) under two scenarios, where drinking is considered to be one of the reasons for committing the crime and where an individual was drunk at the time of the crime.

Introduction

7.2 A Home Office Study (Richardson and Budd, 2003) found that alcohol-related crime and drunken offenders place a huge burden on police and other public services:

- From approximately 10:30pm to 03:00am the majority of arrests are for alcohol-related offences;
- There is the potential for routine incidents of public nuisance to escalate to more serious especially violent, offences;

- Dealing with intoxicated offenders can be difficult and time consuming;
- Intoxicated prisoners can be disruptive, uncooperative and may present severe hygiene problems, urinating or defecating in their clothing during or after arrest.

7.3 The perceptions of the Scottish public, in relation to household and personal crime have been gathered in the 2006 Scottish Crime and Victimisation Survey (Brown and Bolling, 2007)[40]. This was a household survey of people's experiences and perceptions of crime, based on interviews with 4,988 adults throughout Scotland carried out between June and December 2006. There are limitations to this survey, as with other crime surveys[41] although the results are believed to provide the best available indicator of levels and trends in victimisation in Scotland.

7.4 Results from this survey indicate that where respondents were able to say anything about the person or people who committed the crime, 45% said that the person/one of the people was under the influence of alcohol when they committed the crime. This was higher for personal than household crimes (53% compared with 35%) and highest for incidents of assault (67%).

7.5 This survey also found that a minority of victims felt that they were responsible in some way for what happened in the crime (8%) and of these 5% said that this was because they were under the influence of alcohol. However, when asked directly whether they had had any alcohol immediately before the incident took place, 34% of victims said that this was the case (this question was limited to incidents that involved actual or threatened violence).

7.6 Specifically in relation to domestic abuse, analysis of the Scottish Crime and Victimisation Survey found that over three in five (63%) of men and women who had experienced force (n = 70) said that the perpetrator had been drinking alcohol on at least one occasion (Hamlyn and Brown, 2007).

7.7 Additional information with regard to domestic abuse was gathered in the evaluation of a pilot domestic abuse court which was established in Glasgow. This evaluation, which was carried out between October 2004 and October 2006, included an analysis of the characteristics of cases brought before the court and found that in 504 cases (43%), police identified that the alleged offender had consumed enough alcohol to merit mention (Reid Howie Associates, 2007).

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[40] The 2008/09 Scottish Crime and Justice Survey was not used as it was not available when this report was drafted.

[41] In brief, the limitations outlined by Brown are that the survey only provides information on adults living in private households and results can only represent the experience of the people in the sample who take part. Brown also notes that there may be errors in the recall of participants and that it is possible that public perceptions of crime and victimisation may change over time and result in changes in how people report crime from survey to survey. Additionally, he highlights the fact that results are subject to sampling error.

Alcohol-Specific Offences

7.8 There are two offences which specifically mention alcohol. These are 'Drunkenness' and 'Drunk driving'. The number of these offences recorded by the police in 2007/08, the number of persons proceeded against and the number of persons with a charged proved are shown in Table 7.1.

Table 7.1: Number of offences which specifically mention alcohol

	Drunkenness	Drink driving
Number of police recorded offences[1]	6,702	10,697
Persons with a charged proved[2]	235	7,812
Percentage of persons proceeded against with a charge proved[3]	94%	96%
Number of persons proceeded against	250	8,137.5

Source: Scottish Government (2008a)1 and Scottish Government (2009d) (Table 4(a)2 and Table 23)

Custody costs

7.9 Home Office research (Man L-H *et al*., 2002) found that arrests for alcohol-related and alcohol-specific offences were most likely to occur during the night, particularly Friday and Saturday nights. The study also found that drink driving arrestees were usually released, with or without charge, immediately following a breathalyser test. Additionally, those arrested for alcohol-specific offences spent an average of 4.5 hours in custody, whilst those arrested for alcohol-related offences spent an average of 8.7 hours in custody[42]. The longer time spent in custody by those detained on alcohol-related offences appears to be due to the fact these individuals needed a period to sober up before being interviewed, whereas many of those detained for alcohol-specific offences were released on sobering up.

7.10 Scottish custody costs are not available. It has previously been estimated (Cabinet Office, 2003) that the cost of drunkenness in the custody suite is £117.20 for alcohol-specific arrests (i.e. drunkenness and disorder) and £180.60 for alcohol-related arrests. Using the HM Treasury's deflator (HM Treasury, 2009) to uplift costs to 2007/08 prices these costs equate to £141.04 and £217.34 respectively. More recently, in response to a Parliamentary question in 2008, it was reported that the estimated average cost of holding a prisoner in a police cell under Operation Safeguard in England and Wales is in the region of £385 per night[43].

[42] The study differentiates between alcohol-specific offences ('drunk and disorderly', 'drunk and incapable' and 'drink driving') and alcohol-related offences which are offences, other than alcohol-specific offences, where the detainee was drunk or had been drinking (based on an assessment of the custody officer).

[43] This question (under police custody costs) can be found via http://www.parliament.the-stationery-office.com/pa/cm200708/cmhansrd/cm080317/text/80317w0029.htm#08031731000087

7.11 Custody costs have been estimated under the following assumptions:

- The cost associated with those persons detained due to drunkenness but who are not subsequently charged is £141.04;
- Those persons detained due to drunkenness who are subsequently sent to court will have remained in the police station for a period of time to allow them to sober up prior to being interviewed and thus the associated cost is £385;
- Those persons detained for drink driving will probably be released immediately after a breathalyser test meaning that their stay in custody is relatively short, therefore the associated cost is assumed to be £141.04

7.12 Under these assumptions the estimated cost of custody for alcohol-specific offences is £2.5 million (see Table 7.2)

Table 7.2: Estimated custody costs associated with alcohol-specific offences

Alcohol-specific detainees	Cost
Those detained for drunkenness but not proceeded against in court	£910,009
Those detained for drunkenness and proceeded against in court	£96,250
Those detained for drink driving	£1,508,736
TOTAL	**£2,514,994**

7.13 These costs do not include the costs associated with police time in relation to prevention and dealing with the offences.

Court and Prosecution costs

7.14 Scottish court cost for different types of court and stage of disposal[44] are available for 2005/2006 (Scottish Government, 2008e). The average cost per case at each stage of disposal is different. Average costs (weighed by the percentage of cases disposed at each stage) have been calculated for sheriff summary court costs, sheriff summary court prosecution costs and district court prosecution costs.

7.15 In 2007/08 60% of persons with a charge proven attended a sheriff summary court and 35% attended a district court (Scottish Government, 2009d (Table 3)). Court costs for district courts are not available as the local authorities that are responsible for their administration do not collect costs in this way. Hence all expenditure on court proceedings has been estimated using sheriff summary court costs. The overall cost of proceedings in district courts is likely to be lower than in sheriff summary courts (the weighed prosecution cost per case was calculated to be £132 for district courts compared with £330 for sheriff summary courts). However, the small proportion of cases

[44] For example, in the case of sheriff summary courts the stages of disposal are: plea at first diet; plea at intermediate diet and one adjournment for reports; plea at trial diet and one adjournment for reports; case concluded at evidence led trial and on adjournment for reports.

heard in the higher courts (sheriff solemn and high court) would be considerably higher than those incurred in sheriff summary courts[45].

7.16 The ratio of persons charged in sheriff summary courts and district courts is 63.2: 36.8. In estimating prosecution costs it has been assumed that 63.2% of cases can be assigned the weighted average prosecution cost for sheriff summary courts and 36.8% that of district courts. Estimated court and prosecution costs for alcohol-specific offences are displayed in Table 7.3.

Table 7.3: Estimated court and prosecution costs for alcohol-specific offences

	Weighed average cost per case uplifted to 2007/08 prices	Estimated number proceeded against	Total
Sheriff summary court	£285.86	8,388	£2,397,662
Sheriff summary prosecution (based on 63.2% of cases)	£330.88	5,301	£1,655,736
District court prosecution (based on 36.8% of cases)	£132.33	3,087	£385,578
Total			**£4,438,976**

7.17 Estimated court and prosecution costs in relation to alcohol-specific offences are £4.4 million.

Costs associated with imposing penalties

7.18 Information is available on custodial sentences of six months or less in 2007/08. In this year no charges of drunkenness resulted in a prison sentence. However, 179 persons were imprisoned for six months or less as a result of drink driving[46] (Scottish Government, 2009e). Information on the length of prison sentences is provided by length of sentence bands (i.e. 1 to 30 days, 31 to 61 days, etc).

7.19 The current arrangements for releasing offenders are set out in the Prisoners and Criminal Proceedings (Scotland) Act 1993. These arrangements mean that offenders sentenced to less than four years (unless made subject to a supervised release order or certain sex offenders) will be released automatically and unconditionally after serving half of their prison sentence. Using these arrangements, and the mid-points of the length of prison sentence bands, a prison cost for drink driving can be calculated.

[45] This approach was employed when estimating court costs for alcohol-related offences in 2001/02 (Scottish Executive, 2001).

[46] As this figure for prison sentences for drunk driving is (7) lower than that recorded for drink/drug driving in *Criminal Proceedings in Scottish Courts, 2007/08* (Scottish Government, 2009) it has been assumed that there were no prison sentences over six months for persons charged with drink driving.

7.20 There were an estimated 7,378 'prison days' or 20.2 'prison years' resulting from drink driving sentences (See Appendix E, Table E.1). The Scottish Prison Service report an annual average cost per prison place of £32,358 (Scottish Prison Service, 2008b). Therefore the prison cost relating to drink driving is estimated to be £654,075.

7.21 Penalties for drunkenness and drink/drug driving are published by the Scottish Government (Scottish Government, 2009d (Table 8a)) and are reproduced in Table 7.4. Costs for penalties are also published by the Scottish Government (Scottish Government, 2008e). These are only available for 2005/06 but have been up-lifted to 2007/08 prices using the HM Treasury deflator (HM Treasury, 2009). The cost of community service orders has been considered in the Section 6 of this report. There is no information on length of stay in Young Offenders Institution (YOI) for individuals convicted of drink/drug driving and therefore this cost has been omitted from the analysis. Costs associated with penalties imposed for alcohol-specific offences are displayed in Table 7.5.

Table 7.4: Penalties for drunkenness and drink/drug driving

	Drunkenness	Drink/drug driving
Prison		171
YOI		18
Probation	11	262
Community service order		222
Supervised attendance order	1	5
Restriction of liberty order		16
Fine	164	7,057
Caution or admonition	58	58
Absolute discharge	1	3
Total	235	7,812

Source: Scottish Government, 2009d

Table 7.5: Costs associated with the penalties imposed for alcohol-specific offences

	2007/08 costs	No offences	Total cost
Probation[1]	1,384.49	273	£377,966
Supervised attendance order	£476.96	6	£2,862
Restriction of liberty order	9,711.93	16	£155,391
Fine[2]	£1.07	7,221	£7,714
TOTAL		**7,516**	**£543,933**

1 The probation figure covers only "standard" orders and not those which include participation in intensive projects.

2 If paid at court in one instalment[47]

Source: Scottish Government, 2008e

[47] It is recognised that not all people will pay their fine at court in one instalment. Some will pay in several instalments and others may need to be chased more than once before they pay. However, as information is not available on the time taken to pay fines a conservative approach has been taken.

7.22 The estimated cost of prison and other penalties associated with alcohol-specific offences is £1.2 million. The estimated total cost of alcohol-specific offences (custody, court costs and penalties) is £8.2 million

Alcohol-Related Crimes and Offences

Estimating the Volume of Alcohol-related Crime

7.23 It is difficult to assess the level of crime with certainty. It is known that not all incidents are reported to the police and the hidden burden of crime is believed to be substantial. The British Crime Survey (BCS) (Kershaw *et al.*, 2009) provides a measure of the level of crime committed against the private household population in England and Wales. It considers different types of crimes and populations to those recorded by the police. An assessment, by the BCS, of a comparable subset of crimes recorded by the police suggests that only about 42% of these crimes are brought to the attention of the police.

7.24 Neither the BCS nor recorded crime statistics measure the total volume of offences. The BCS does not include individuals under 16 years of age in its sample, nor does it include all crime types (it excludes crimes such as murder where the victim cannot, by definition, be interviewed); fraud; and so-called victimless crimes (e.g. drug dealing). Recorded crime statistics in theory cover the full range of crimes no matter what the age of the victim, but miss crimes that go unreported.

7.25 As part of a programme of work funded by the UK Department of Health (DH) Policy Research Programme a team from the University of Sheffield recently built a model to appraise alcohol pricing and promotion policy (Brennan *et al.*, 2008). In Spring 2009 the Scottish Government commissioned work to adapt this model to the Scottish population (Purshouse *et al.*, 2009).

7.26 For the purposes of the current study, cost estimates have been derived using the volume of alcohol-related crime estimated by Purshouse (Purshouse *et al.*, 2009). The steps used by Purshouse et al. are outlined in paragraphs 7.27 – 7.32.

7.27 Scottish alcohol attributable crime fractions and costs are not available. To allow English alcohol attributable fractions to be applied to Scottish crime figures the first step was to match Scottish crime categories with English crime categories (see Table 7.6).

Table 7.6: Matching Scottish crime categories with existing English crime categories

Scottish crime category	English crime category
Serious assault, other non-sexual crimes of violence	Causing death by dangerous driving; Driving under the influence; Driving after having consumed excess alcohol; More serious wounding; Violent disorder; Homicide; Less serious wounding
Robbery	Robbery; Robbery - business
Total sexual offences	Total sexual offence
Housebreaking – Domestic dwelling	Burglary in a dwelling
Housebreaking – Domestic non-dwelling and other	Burglary not in a dwelling
Theft from a motor vehicle	Theft from vehicle
Theft of a motor vehicle	Aggravated vehicle taking; Theft of vehicle
Shoplifting	Theft from shops
Other theft	Theft from the person; Theft of a pedal cycle; Other theft
Fire-raising	Criminal damage
Vandalism etc	Criminal damage
Minor assault	Assault without injury

Source: Purshouse *et al*., 2009 (Table 2.8).

7.28 Scottish crimes are categorised as 'crimes' or 'offences'. In 2007/08 the Scottish police recorded 385,509 crimes and 571,881 offences (Scottish Government, 2008d). The matching above incorporates 67.9% of Scottish police recorded crimes. However, the only offence included is that of 'minor assault' (which makes up 12.7% of Scottish police recorded offences)[48].

7.29 To take into account under-reporting of crimes, multipliers were applied to recorded crime statistics to estimate the actual crime volumes[49]. The multipliers used to uplift the recorded crime volume were based on the British Crime Survey 2003. Note that The Scottish Crime and Victimisation Survey was not used to derive the multipliers due to the small sample size and large confidence intervals[50]. These multipliers and figures for police recorded and total crime can be found in Table 7.7.

[48] There are two main reasons why some crimes are not matched. Firstly, the crime is less likely to be alcohol-related (for example, fraud) and, secondly, insufficient detail is known about the crime (for example, crimes in the 'other category') to be able to match across to an English crime category. Whilst there is likely to be an alcohol element to some of the crimes in the second category, there is insufficient information to allow a multiplier, alcohol attributable fraction, or cost to be applied. The omission of these crimes from the analysis is likely to lead to the overall estimate being an under-estimate.

[49] As the multipliers are only applied to about 70% of recorded police crime this could have a significant impact on overall costs.

[50] The 2008/09 Scottish Crime and Justice Survey was not used as it was not available when this report was drafted.

Table 7.7: Crime volumes – police recorded and estimated total

Crime category	Police recorded crime (2007/08)	Multiplier	Total volumes
Serious assault, other non-sexual crimes of violence	6,398	1.8	11,516
Robbery	3,064	3.7	11,337
Total sexual offences	6,552	5.2	34,070
Housebreaking – Domestic dwelling	12,437	2.2	27,361
Housebreaking – Domestic non-dwelling & other	13,006	2.1	27,313
Theft from a motor vehicle	6,727	2.8	18,836
Theft of a motor vehicle	12,105	1.2	14,526
Shoplifting	29,186	100.0	2,918,600
Other theft	57,918	2.7	156,379
Fire-raising	4,616	4.3	19,849
Vandalism etc	109,855	4.3	472,377
Minor assault	72,770	7.7	560,329

Source: Purshouse et al. 2009 (Appendix 8).

7.30 The police recorded crime volumes do not provide a break down of offences by age and gender and Purshouse et al. employed the method used in the development of the English model to split the crimes into different population sub-groups. This involved using Office for National Statistics data on the age distribution of offenders found guilty or cautioned and making assumptions to allow mapping between offence categories and crime where appropriate. Additionally, figures were adjusted according the authors' modelled age distributions (details of this methodology can be found in Section 2.6.2 of Brennan *et al.*, 2008). Crime volumes calculated using this approach are presented in Table 7.8.

Table 7.8: Estimated number of offences committed by sex and age group

	Age 11 – 15		Aged 16+	
	Male	Female	Male	Female
Serious assault, other non-sexual crimes of violence	2,061	788	7,395	1,273
Robbery	2,939	840	7,138	420
Total sexual offences	8,518	0	25,552	0
Housebreaking - domestic dwelling	7,044	813	18,421	1,083
Housebreaking - Domestic non-dwelling & other	7,031	811	18,389	1,082
Theft from a motor vehicle	2,997	1,924	10,214	3,701
Theft of a motor vehicle	2,312	1,484	7,876	2,854
Shoplifting	464,453	298,167	1,582,581	573,399
Other theft	24,885	15,976	84,795	30,723
Fire-raising and vandalism	143,565	30,765	287,132	30,763
Minor assault	100,269	38,338	359,791	61,931

Source: Purshouse *et al.*, 2009 (summarised from Appendix 9).

7.31 Alcohol attributable fractions (AAFs) estimate the proportion of each crime category associated with alcohol. As noted above, there are currently no Scottish specific alcohol attributable crime fractions available. We use the AAFs reported in Purshouse et al. which were estimated by the Home Office for each crime category using the youth offending data from the 2006 Offending Crime and Justice Survey – a survey of approximately 5,000 people aged from 10 to 25 years living in private households in England and Wales. The Offending Crime and Justice Survey (Roe and Ashe, 2008) only covers 20 'core offences', in particular, serious offences, including homicide and sexual offences are omitted.

7.32 Two sets of AAFs were used to derive the cost estimates. The first (table 7.9a) set relates to 'drunk as one of the reasons for committing the crime' (the Purshouse *et al*. baseline assumption set out in Table 2.9 of that report) and the second (table 7.9b) set relates to 'drunk at the time of crime'. The AAFs are displayed in Appendix E, Table E.2 and the resultant estimates of the volume of alcohol-related crime (police recorded and unrecorded) for these two sets of AAFs can be found in Table 7.9a and Table 7.9b.

Table 7.9a: Estimated volume of alcohol-related crime for 'drunk as one of the reasons for crime' (police recorded and unrecorded crime)

Scottish crime category	OCJS matched category	Drunk as one reason for crime			
		Number of alcohol-related crimes			
		Aged 11 – 15		Aged 16+	
		Male	Female	Male	Female
Serious assault, other non-sexual crimes of violence	Assault with injury	62	53	1,205	186
Robbery	Other theft	18	18	257	9
Total sexual offences	All violent offences	145	0	4,344	0
Housebreaking - domestic dwelling	Other theft	42	18	663	24
Housebreaking - Domestic non-dwelling & other	Other theft	42	18	662	24
Theft from a motor vehicle	Vehicle related thefts	0	525	695	1,425
Theft of a motor vehicle	Vehicle related thefts	0	405	536	1,099
Shoplifting	Other theft	2,787	6,560	56,973	12,615
Other theft	Other theft	149	351	3,053	676
Fire-raising and vandalism	Criminal damage	5,312	3,723	115,714	9,475
Minor assault	Assault with injury	702	1,073	64,043	7,989
TOTAL		**9,259**	**12,745**	**248,144**	**33,521**

Table 7.9b: Estimated volume of alcohol-related crime for 'drunk at the time of crime' (police recorded and unrecorded crime)

Scottish crime category	OCJS matched category	Drunk at time of crime			
		Number of alcohol-related crimes			
		Aged 11 – 15		Aged 16+	
		Male	Female	Male	Female
Serious assault, other non-sexual crimes of violence	Assault with injury	142	95	3,557	404
Robbery	Other theft	85	91	650	16
Total sexual offences	All violent offences	468	0	10,911	0
Housebreaking - domestic dwelling	Other theft	204	88	1,676	40
Housebreaking - Domestic non-dwelling & other	Other theft	204	88	1,673	40
Theft from a motor vehicle	Vehicle related thefts	515	525	3,248	1,710
Theft of a motor vehicle	Vehicle related thefts	398	405	2,505	1,319
Shoplifting	Other theft	13,469	32,202	144,015	21,216
Other theft	Other theft	722	1,725	7,716	1,137
Fire-raising and vandalism	Criminal damage	18,663	7,445	166,824	14,213
Minor assault	Assault with injury	4,412	2,645	130,964	15,916
TOTAL		**39,283**	**45,309**	**473,738**	**56,009**

Estimating the Cost of Alcohol-related Crime

7.33 Data on the costs of crimes committed in Scotland are not available. However, the Home Office have produced two reports (Brand and Price, 2000 and Dubourg and Hamed, 2005) which provide estimates of the cost of specific crimes. Although these are not Scottish specific costs and they only consider the costs of crimes against individuals (16 years and over) and households they are considered to be the best data for the purposes of the current study[51].

7.34 Dubourg and Hamed (Dubourg and Hamed, 2005) explain that in deriving these costs some components have been effectively weighted by the probability that they will be incurred, which in turn depends on the probability that an offence is reported, recorded, investigated, etc. Given this, it is appropriate to use estimates of crimes committed rather than crimes recorded by police as the basis for estimating costs.

7.35 The costs are divided into three categories:

- Costs in anticipation of crime – includes defensive expenditure and insurance administration;
- Costs as a consequence of crime – includes physical and emotional impact on direct victims, value of property stolen, property damaged/destroyed, property recovered, victim services, lost output and health services;

[51] Note that this is the approach taken by Purshouse, et al. and also in the recent report which assessed the scale and impact of illicit drug markets in Scotland (Scottish Government, 2009f)

- Criminal justice system costs – includes police activity, prosecution, magistrates' court, crown court, jury service, legal aid, non-legal aid defence, probation service, prison service, other criminal justice service costs, criminal justice service overhead, criminal injuries compensation.

7.36 Unit costs extracted from the literature have been uplifted to 2007/08 prices using GDP deflators published by HM Treasury (HM Treasury, 2009) (see Appendix E, Tables E.3 for uplifted unit costs). The resultant cost estimates are presented in Table 7.10.

Table 7.10a: Summary of costs in anticipation of, consequence of and response to crime (drunk as one reason for crime) (2007/08)

Cost category	Scottish Government offence category	Drunk as one reason for crime		
		Costs in anticipation of crime	Costs as a consequence of crime (excluding health services)	Criminal Justice System costs
Wounding (serious wounding, other wounding)	Serious assault, other non-sexual crimes of violence	£3,340	£9,564,968	£23,958,350
Robbery	Robbery	£7,041	£1,400,565	£872,126
Sexual offences	Total sexual offences	£39,827	£135,490,492	£16,418,564
Burglary in a dwelling	Housebreaking - domestic dwelling	£329,799	£1,435,207	£942,165
Burglary not in a dwelling*	Housebreaking - Domestic non-dwelling & other	£863,894	£1,091,234	£445,587
Theft from vehicle	Theft from a motor vehicle	£486,914	£1,883,124	£146,661
Theft of vehicle	Theft of a motor vehicle	£2,071,983	£6,835,735	£450,136
Theft from a shop*	Shoplifting	£2,887,216	£4,812,027	£1,924,811
Theft - not vehicle	Other theft	£154,793	£1,411,903	£1,411,903
Criminal damage	Fire-raising and vandalism	£7,294,480	£103,015,926	£18,757,235
Common assault	Minor assault	£0	£87,016,462	£20,874,128
TOTAL		**£14,139,288**	**£353,957,644**	**£86,201,667**

* Categories marked with an asterisk were taken from Brand and Price, 2000, all other unit costs were taken from Dubourg and Hamed, 2005.

Table 7.10b: Summary of costs in anticipation of, consequence of and response to crime (drunk at time of crime) (2007/08)

Cost category	Scottish Government offence category	Drunk at time of crime		
		Costs in anticipation of crime	Costs as a consequence of crime (excluding health services)	Criminal Justice System costs
Wounding (serious wounding, other wounding)	Serious assault, other non-sexual crimes of violence	£9,310	£26,660,413	£66,779,052
Robbery	Robbery	£19,589	£3,896,323	£2,426,224
Sexual offences	Total sexual offences	£100,965	£343,482,777	£41,622,803
Burglary in a dwelling	Housebreaking - domestic dwelling	£886,576	£3,858,164	£2,532,755
Burglary not in a dwelling*	Housebreaking - Domestic non-dwelling & other	£2,322,278	£2,933,403	£1,197,806
Theft from vehicle	Theft from a motor vehicle	£1,104,411	£4,271,277	£332,654
Theft of vehicle	Theft of a motor vehicle	£4,699,612	£15,504,615	£1,020,986
Theft from a shop*	Shoplifting	£7,714,274	£12,857,123	£5,142,849
Theft - not vehicle	Other theft	£413,588	£3,772,425	£3,772,425
Criminal damage	Fire-raising and vandalism	£11,257,430	£158,982,474	£28,947,676
Common assault	Minor assault	£0	£181,487,382	£43,536,484
TOTAL		**£28,528,032**	**£757,706,377**	**£197,311,713**

* Categories marked with an asterisk were taken from Brand and Price, 2000, all other unit costs were taken from Dubourg and Hamed, 2005.

7.37 The estimated cost of crimes to the criminal justice service is between £86.2 and £197.3 million. Costs as a result of crimes (excluding health service costs) are estimates to be between £354.0 and £757.7 million. The costs in anticipation of crime are estimated to be between £14.1 and £28.5 million, generating a total estimated cost of between £454.3 and £983.5 million.

7.38 It should be noted that the current exercise seeks to estimate the costs of crimes related to alcohol misuse during the 2007/08 financial year. However, in the methodology used by Dubourg and Hamed the sentence cost estimate includes the cost of enforcing sentences in the years following conviction and as such may represent an over-estimate.

7.39 Criminal proceedings in Scottish Courts, 2007/08 (Scottish Government, 2009) states that custody is the most frequently used sentence for most types of crime involving violence and also rape and attempted rape. This report also states that the average length of determinate custodial sentences during 2007/08 was 8 months. Therefore, for many of the crimes considered, the total cost is likely to be incurred in the current financial year so any over-estimation is likely to be minimal.

Limitations and Summary of Costs

Limitations

7.40 The research carried out by Man *et al.*'s research was carried out in February 2000. Data were collected from three police stations. All of these police stations were located in metropolitan entertainment areas. Therefore, findings may not reflect the experiences of custody suites in other types of areas or those of nine years later.

7.41 The custody cost associated with drink-driving may be an over-estimate as the length of time in custody for these individuals is likely to be minimal. However, the custody cost associated with drunkenness may be an underestimate as there will be a number of individuals detained for interview who will not go on to be charged.

7.42 Multipliers, which reflect the number of crimes not reported to the police, have been used to uplift recorded police crime levels to 'true' crime levels. It should be recognised that there is always going to be some degree of uncertainty around the level of under reporting.

7.43 In the process of matching Scottish crime categories to English crime categories and available AAFs 123,645 (32.1%) of police recorded crimes and 481,712 (86.9%) of offences were omitted from further analyses. This means that the police recorded crime figures that were used as the basis of estimating 'true' levels of crime may be considered as an underestimate.

7.44 AAFs that were used in the analysis are based on survey responses made by individuals aged between 10 and 25 years of age. Therefore, whilst the AAFs used may be applicable to many of the crimes committed by those aged under 30, they may not be applicable to older age groups. As such, there may be some potential for over-estimating the level of crime associated with alcohol. However, this propensity to overestimate is ameliorated by the fact that figures from *Criminal Proceedings in Scottish Courts, 2007/08* (Scottish Government, 2009) indicate that about two-thirds of persons with a charge proved for a crime are aged 30 or under.

7.45 Additionally, the estimates derived from AAFs relating to 'drunk as one reason for crime' are very low when compared with public perceptions of alcohol-related crime as reported in, for example, the Scottish Crime and Victimisation Survey, or the proportion of prisoners who said that they were drunk at the time of their offence (49%) (Scottish Prison Service, 2008). The AAFs relating to 'drunk at time of crime' are more in line with, but still lower than, public perceptions of alcohol-related crime. Overall, the use of AAFs appears to lead to a conservative estimate of the level of alcohol-related crime

7.46 Due to the lack of available data, English unit costs rather than Scottish unit costs were used. Furthermore, the work by Dubourg and Hamed (Dubourg and Hamed, 2005) updates estimates of the costs of crime published by Brand and Price (Brand and Price, 2000). The limitations of the original Brand and Price work are detailed in their paper (Brand and Price, 2000) and include:

- Average cost estimates are best estimates of costs given the information available. However, due to lack of good information in a number of areas, the estimates are inevitably imprecise;
- The costs of an identical crime may fall differentially on different social, economic or geographic groups – repeat victims, or elderly people, for example, may suffer greater psychological costs than other members of society;
- Some crimes are inevitably costed less accurately than others, and unquantified costs exist which may differ between crimes. A comparison of average costs between different crimes could therefore be misleading. A higher average cost for one crime than for another could reflect the size of quantified, rather than unquantified costs, rather than a real difference in the costs of the crimes to society.

7.47 Given the limitations outlined above, estimated figures should only be considered as providing an indication of the level of cost associated with crimes and offences that result as a consequence of alcohol misuse. A summary of the cost estimates derived in this section is presented in Table 7.11.

Table 7.11: Summary of crime costs associated with alcohol misuse

Category	Cost category	Cost 2007/08
Alcohol-specific offences	Custody costs	£2.5 million
	Court costs	£4.4 million
	Penalty costs	£1.2 million
Alcohol-related crimes and offences	Costs in anticipation of crime	Midpoint: £21.3 million Range: £14.1 - £28.5 million
	Costs in response to crime	Mid-point: £555.8 Range: £354.0 -£757.7million
	Criminal Justice costs	Mid-point: £141.8 Range: £86.2 -£197.3 million
TOTAL CRIME RELATED COSTS		**Mid-point: £727.1 million Range: £462.5 – £991.7million**

8 COST TO PRODUCTIVE CAPACITY OF SCOTTISH ECONOMY

Summary

- This section estimates the cost of alcohol misuse to the productive capacity of the Scottish economy in 2007.
- The biggest impact was due to premature mortality, which significantly reduced the potential working years of those dying due to alcohol-related causes before the age of 65 years.
- Excluding the protective effects of alcohol consumption on mortality, the estimated cost of premature mortality to the Scottish economy was estimated to be £287.9 million - £348.0 million (depending on the source of the data on premature mortality), with a mid-point of £318.0 million.
- Including the beneficial effects of alcohol in preventing some premature deaths gives a cost of premature mortality to the Scottish economy of about £313.3 million.
- Presenteeism (range: £177.0 million - £193.1 million; mid-point: £185.1 million), absenteeism (range: £109.4 million - £273.5 million; mid-point: £191.5 million) and unemployment (range: £150.9 million - £191.5 million; mid-point: £171.2 million) due to alcohol misuse were each estimated as having mid-point cost impacts of similar magnitudes in 2007.
- The estimated cost to the productive capacity of the Scottish economy in 2007 due to the effects of alcohol misuse was £725.2 million - £1,006.1 million, with a mid-point of £865.7 million.

Introduction

8.1 Various studies have shown that many people who misuse alcohol are in employment (e.g. HSE, 1996; Single *et al.,* 2003).

8.2 The international guidelines for estimating the costs of substance misuse (Single *et al.*, 2003) state that the impact on and costs to the productive capacity of the economy under consideration should be included in the calculations. This requires "*robust estimates of premature mortality and morbidity that can be attributed to substance abuse*".

8.3 Studies of the costs associated with alcohol misuse do, however, differ with regard to the elements that should be included in the analysis to capture this impact. The following three possibilities for reducing the productive capacity of an economy are identified in studies of alcohol misuse:

- ***Absenteeism*** (i.e. taking paid time off work due to health-related and other problems, some of which may be directly or indirectly due to alcohol misuse);
- ***Unemployment*** (i.e. not being in paid employment because of health-related or other problems directly or indirectly due to alcohol misuse);
- ***Premature mortality*** (i.e. dying before the official age of retirement where alcohol is the underlying or a contributory cause of death).

In addition, ***presenteeism*** (i.e. the reduced activity and productivity of those who misuse alcohol but who are at work) is included in some studies.

8.4 According to Single *et al.* (2003), prior studies have found that "*the largest part of morbidity/lost and reduced productivity costs is not due to measurable lost days of work, but from impaired productivity while on the job*". Nevertheless, due to methodological and measurement concerns, presenteeism is not considered in all of the recent studies of the costs of alcohol misuse undertaken in the UK[52].

8.5 Presenteeism and absenteeism, which both reduce the productivity of the workforce, impact directly upon employers, whilst unemployment and premature mortality in the working population affects employers and individuals.

8.6 It can be argued (e.g. Single *et al.* 2003) that if labour markets worked perfectly (from an economist's perspective), any reduction in a worker's productivity due to substance misuse would result in a reduction in the wages that the employer was willing to pay that person. Thus such costs would be private costs borne by the employee rather than by the employer. However, labour markets generally do not function perfectly and wages and wage structures are much more rigid.

8.7 This section explores the impacts of these four elements identified in paragraph 8.4 on Scotland's productive capacity. The economic costs are estimated using a human capital approach (Scottish Government, 2008a), which involves applying a cost, based on average wages, to lost productive time.

8.8 Tables F.1 – F.3 in Appendix F summarise the employment-related data for Scotland in 2007 that underpin many of the subsequent calculations. Table F.1 shows the employment status of those aged 16+, whilst Tables F.2a and F.2b in Appendix F summarise data on average earnings in Scotland in 2007. Table F.3 considers the numbers of workers who are employees and self-employed and who are full-time and part-time workers.

[52] The initial Scottish study (Scottish Executive, 2001) included absence from work, unemployment, and premature mortality of the working population. The Cabinet Office Strategy Unit study for England (Cabinet Office Strategy Unit, 2003) included cost estimates for absenteeism, reduced employment and premature death, but was unable to estimate a cost associated with reduced employment efficiency (i.e. presenteeism). A more recent Scottish study (Scottish Government, 2008) did include an estimated cost of presenteeism.

Presenteeism

8.9 A survey undertaken in 2004 by reed.co.uk suggested that workers turn up at work with a hangover on an average of two and a half days per year (InfoScotland.com website[53]). These workers thought that they were 27% less efficient on these days, leading the Info.Scotland.com website to suggest that the productivity lost to hangovers could therefore account for an additional 1.62 million lost days, at a cost of £154 million.

8.10 The Scottish Government's 2008 update of earlier work (Scottish Government, 2008a) suggests that if workers lose the equivalent of an average of 0.68 days annually (i.e. 27% of 2.5 days, as stated in the previous paragraph), this equates to approximately 1.7 million days per year, at a cost of about £203 million (in 2006/07).

8.11 A survey carried out for Norwich Union Healthcare in December 2007 (Institute of Alcohol Studies, 2009[54]) found that a third of employees admitted to having been to work with a hangover. Almost one-in-six (15%) reported having been drunk at work. One-in-ten employees reported hangovers at work once a month, whilst one-in-twenty did so once a week. Work problems resulting from hangovers or being drunk at work included difficulty concentrating, reduced productivity, tiredness, and mistakes. However, these data do not include an estimate of the lost productivity associated with hangovers and drunkenness at work.

8.12 Table F.3 in Appendix F shows that 2,551,000 persons were in employment in Scotland in 2007 (1,340,000 men and 1,211,000 women)[55].

8.13 Assuming that each worker (irrespective of employment status) lost an average of 0.68 days per year (see paragraph 8.10) due to alcohol-related inefficiencies at work, a total of more than 1.7 million days of work (1,734,860) were lost during 2007.

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[53] InfoScotland.com, *Alcohol and the Workplace – Productivity and Safety*, http://www.infoscotland.com/alcohol/displaypage.jsp?pContentID=49&p_applic=CCC&p_service=Content.show&

[54] These statistics are included in an Institute of Alcohol Studies Factsheet – *Alcohol and the Workplace*, based on the findings from a report compiled from research carried out by Vanson Bourne and YouGov commissioned by Norwich Union Healthcare in 2007.

[55] There is slight inconsistency in the figures in Table F.1 and F.3, as Table F.1 includes 2,556,000 workers whereas Table F.3 indicates 2,551,000 workers. The figures from Table F.3 have been used (i.e. a total of 2,551,000 in employment) throughout the analysis, as these include a breakdown into full-time workers and part-time workers.

8.14 The estimated median gross cost per day for employers is shown in Table F.2b. In this Table, the gross weekly earnings of full-time employees in April 2007 (see Table F.2a) have been uplifted by 4.6% to reflect the increase in weekly pay between April 2007 and April 2008, based on the findings of the 2008 Annual Survey of Hours and Earnings[56]. Uplifts of 10% and 20%[57] have also been included to reflect the estimated additional costs, such as National Insurance contributions and pension contributions, incurred by employers on behalf of some employees. This gives values of £116.18 per day (with 10% uplift) and £126.73 (with 20% uplift).

8.15 If it is assumed that all workers (irrespective of whether they are employees of self-employed and whether they work full-time or part-time) 'lose' the equivalent of 0.68 work days per year due to alcohol misuse, presenteeism reduced output by about £202 million - £220 million during 2007/08, as shown in Table 8.1.

8.16 However, if it is assumed that the 620,000 part-time workers only 'lose' an average of 0.34 days per year due to alcohol misuse, this results in lost output due to presenteeism of about £177.0 million - £193.1 million during 2007/08, as also shown in Table 8.1.

Table 8.1: Costs of Alcohol-related Presenteeism to the Scottish Economy in 2007

	Days lost due to presenteeism	**With 10% uplift (i.e. at £116.18 per day)**	**With 20% uplift (i.e. at £126.73 per day)**
Assuming all workers 'lose' 0.68 days per year	1,734,680	£201,535,122	£219,835,996
Assuming full-time workers 'lose' 0.68 days per year and part-time workers lose 0.34 days per year	1,523,880 (1,313,080 by full-time workers and 210,800 by part-time workers)	£177,044,378 (£152,553,634 by full-time workers and £24,490,744 by part-time workers)	£193,121,312 (£166,406,628 by full-time workers and £26,714,684 by part-time workers)

8.17 It should also be noted that there may be some positive benefits associated with drinking with workplace colleagues and business associates, such as increased productivity due to positive 'networking' effects gained from such socialisation (Cabinet Office Strategy Unit, 2003).

8.18 The quantifiable cost to the Scottish economy in 2007 of alcohol-related presenteeism is estimated to be £177.0 million - £193.1 million, with a mid-point of £185.1 million.

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[56] See http://www.statistics.gov.uk/cci/nugget_print.asp?ID=285 (published on 14 November 2008).

[57] Although an uplift of 10% is plausible, given that not all employers pay national insurance contributions and/or pension contributions for all staff, an uplift of 20% is also used to include an element of other oncosts (e.g. heating and lighting of premises) associated with employing staff.

Absenteeism

8.19 Several national and international estimates have been made of the extent of alcohol-related absenteeism and its costs to the economy. A UK study published in 1981[58] estimated that alcohol caused 3% - 5% of all absence from work, equating to about 8 million – 14 million working days in the UK each year.

8.20 However, alcohol consumption has increased considerably since the early 1980s, and a study undertaken in 2001 across the UK workforce calculated that over 176 million working days were lost due to sickness and absenteeism, with 6% - 15% of this aggregate (i.e. about 11 million – 17 million days) attributed to alcohol-related sickness (Leontaridi, 2003, quoted in Scottish Government, 2008a).

8.21 The Scottish Government (Scottish Government, 2008a) used CBI/AXA data on absenteeism for 2006 to calculate that alcohol-related absence cost the Scottish economy about £200m during that year[59].

8.22 According to the CBI/AXA Absence Survey (CBI, 2008), the average employee took about 6.7 days of sick leave during 2007[60].

8.23 Based on an employed workforce of 2,551,000 people (see Table F.3) and each employee (irrespective of employment status) having an average of 6.7 days of sick leave, there were a total of about 17 million (17,091,700) days of sick leave in Scotland in 2007.

8.24 However, if it is assumed that the 620,000 part-time workers have an average of 3.35 days of sick leave each year, there would have been slightly over 15 million (15,014,700) days of absence in Scotland in 2007. Table 8.2 summarises the associated costs under different assumptions about the proportion of sick days due to alcohol (i.e. 6% and 15%), based on an average cost per employee of £116.18 per day and of £126.73 per day (see Table F.2b).

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58 Holterman S and Burchill A (1981), *Government Economic Service Working Party No.37*, DHSS – quoted in Health and Safety Executive (1996), *Don't mix it – a guide for employers on alcohol at work*.

59 The study also estimated that the cost could be £280 million if absenteeism due to alcohol had been at the higher end of the 6% - 15% estimate.

60 The average absence levels in the public sector were nine days, which was 55% higher than the average of 5.8 days for the private sector.

Table 8.2: Costs of Alcohol-related Absenteeism in Scotland, 2007

	Total Days of Absence	Days due to Alcohol Misuse		Cost due to Alcohol Misuse (Range for £116.18 & £126.73 per day)	
		6%	15%	6%	15%
Full-time employees (1,931,000)	12,937,700	776,262	1,940,655	£90,178,357 - £98,375,683	£225,445,891 - £245,939,208
Part-time employees (620,000)	2,077,000	124,620	311,550	£14,477,105 - £15,793,093	£36,192,764 - £39,482,732
All employees (2,551,000)	**15,014,700**	**900,882**	**2,252,205**	**£104,665,462 - £114,168,776**	**£261,638,655 - £285,421,940**
Mid-point				**£109,412,119**	**£273,530,297**

8.25 Table 8.2 suggests an annual cost to the Scottish economy in 2007 of £109.4 million - £273.5 million due to absences from work resulting from alcohol misuse, with a mid-point value of £191.5 million.

8.26 A recent study in Australia has used data collected as part of the 2001 National Drug Strategy Household Survey to consider the extent and cost of alcohol-related absenteeism in the Australian workforce (Pidd *et al.*, 2006; Roche *et al*., 2008). Respondents suggested that 3.5% of people had taken absence from work for one day or more in the previous three months as a consequence of their alcohol consumption, compared with 39.7% because of illness/injury not due to alcohol (Roche *et al.*, 2008)[61]. The analysis also found that young employees and males were more likely to report alcohol-related absenteeism than older workers and females.

8.27 However, although the emerging picture of drinking patterns in Roche *et al.* (2008) is interesting, it is a previous paper by the same team of researchers (Pidd *et al.* 2006) that is potentially of greater relevance to this current analysis. Using the same data set (i.e. from the 2001 Australian National Drug Strategy Household Survey), the researchers estimated that the mean number of days of alcohol-related absenteeism during the previous 12 months per employee had been 0.350 (95% CI: 0.254-446).

8.28 If every person in employment in Scotland in 2007 had had 0.35 days of alcohol-related absenteeism, this would have resulted in 892,850 such days at a total cost of about £104 million to £113 million[62]. However, these values assume that drinking and absenteeism patterns in Scotland in 2007 are the same as those in Australia in 2001, which seems unlikely.

[61] This study also found that "*alcohol-related absenteeism is not restricted to small numbers of chronic heavy drinkers, but also involves the much larger number of risky non-dependent drinkers who drink less frequently at risky levels*".

[62] The costs would have been £103,722,385 at £116.17 per day and £113,150,881 at £126.73 per day.

8.29 A recently-published Norwegian study (Norström and Moan, 2009) addressed the relationship between *per capita* alcohol consumption and sickness absence in Norway. It was based on a study (Johansson *et al.*, 2009) using Swedish time-series data that had shown that a one litre increase in consumption was associated with a 13% increase in sickness absence among men. Although the Norwegian study strengthened the conclusion from the Swedish study, it used data for manual employees for 1957-2001, which limits its relevance to this study.

8.30 However, the Norwegian study does cite two previous Norwegian studies (Grimsmo and Rossow, 1997) and (Hammer, 1999) that had estimated that between 14% and 50% (depending on assumptions) of total short-term sick leave (i.e. of 1-3 days) could be attributable to alcohol. Such data further reinforce the limited knowledge of the extent of the relationship between alcohol and sickness absence during the 1990s, which does not seem to have improved significantly during the 2000s.

8.31 Therefore the most reliable estimate of the annual cost to the Scottish economy in 2007 of absences from work resulting from alcohol misuse is £109.4 million - £273.5 million, with a mid-point value of £191.5 million.

Unemployment

8.32 The relationship between alcohol misuse and unemployment is not clear cut, although there is some evidence (Cabinet Office Strategy Unit, 2003) that excess drinking is negatively associated with employment.

8.33 The University of Sheffield's systematic review of the effects of alcohol pricing and promotion (Booth *et al.*, 2008) concluded (Evidence statement 22) that:

> "*no recent systematic reviews or meta-analyses were identified that examined the effects of alcohol … on employment-related outcomes such as unemployment or absenteeism*".

8.34 The modelling work undertaken as part of the Sheffield study for the Department of Health (Brennan *et al.*, 2008) refers to a study by MacDonald and Shields (2004), which showed that "problem drinking" (measured by a combination of psychological and physical symptoms or in terms of quantity and frequency of alcohol consumption) was negatively associated with the probability of being in work. The study, which analysed data from the Health Survey for England (1997-1998) and focused on males aged 22-64 years old, showed that being a "problem drinker" led to a reduction in the probability of working of between 7% and 31%. Figures were not reported for females.

8.35 This current study uses two approaches to estimate the costs to the Scottish economy due to alcohol-related unemployment, but recognises the considerable limitations associated with each approach.

Approach 1: Based on Study by Catalyst/Scottish Executive 2001

8.36 The Scottish study by Catalyst (Scottish Executive, 2001) stated that data on the number of people unemployed in Scotland due to alcohol misuse are not available. Catalyst used an approach (after Meltzer, 1995) to calculate the unemployment rate among those with an "alcohol dependency" (which was not specifically defined in the report) using the prevalence rate for alcohol dependency stratified by employment status. These calculations suggested that 10% of males and 3% of females who were alcohol-dependant were unemployed in Scotland. Subtracting the general unemployment rates at that time of 7% for men and 2% for women indicated an "excess" unemployment rate for alcohol dependents of 3% for men and 1% for women. The Catalyst study calculated that that there were 3,536 unemployed individuals (3,393 males and 138 females) in Scotland in 2001 due to alcohol dependency, at a cost to the Scottish economy of £84 million[63].

8.37 Due to the absence of more recent research data on the relationship between alcohol and unemployment, an attempt was made to replicate the Catalyst approach in this study (whilst recognising that the data need to be treated with caution). Data shown in Table 2.1, derived from SHeS 2008 (Scottish Government, 2009a), estimate that there were a total of about 230,000 (141,000 males and 88,000 females) adults drinking at harmful levels (defined as more than 50 units per week for males and more than 35 units per week for females) in Scotland in 2007. These data have been used to as a proxy for the numbers of "alcohol-dependent" males and females in Scotland for this element of the analysis[64].

8.38 In terms of working age adults (i.e. those aged 16-64), there were a total of 212,350 (131,301 males and 81,049 females) such persons.

8.39 Table F.1 in Appendix F shows that 84.0% of males and 77.5% of females of working age were economically active in Scotland in 2007. These percentages therefore equate to 110,293 economically-active, alcohol-dependent males and 62,813 economically-active, alcohol-dependent females in Scotland in 2007. Table F.1 also shows that 4.5% of all economically active people aged 16 and above were unemployed (4.5% for males and 4.6% for females) in 2007.

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[63] This figure was recently updated for inflation (Scottish Government, 2008), suggesting that the excess unemployment due to alcohol dependency cost the Scottish economy about £96 million in 2006.

[64] It should be noted that the original Catalyst report did not specifically define alcohol dependency, and that the number of people with alcohol dependency (as defined in paragraph 2.4) cannot be calculated directly from SHeS 2008. Furthermore, these data are in line with the estimated range of 206,032 – 302,099 for the number of dependent drinkers based on the Psychiatric Morbidity Survey 2000 and SHeS 2003 in the *Scottish Alcohol Needs Assessment* (Drummond *et al.* 2009), where the authors state a preference for the lower estimate.

8.40 If 10% of alcohol-dependent males in Scotland were unemployed in 2007, these data suggest that the 'excess' unemployment amongst men due to alcohol dependency in 2007 was 5.5% (i.e. 10%–4.5%), which equates to 6,066 unemployed males in 2007 due to alcohol dependency. However, these does not appear to be any 'excess' unemployment amongst women in 2007 due to alcohol dependency (as 4.6% exceeds 3%).

8.41 Based on average annual gross earnings for males in Scotland of £26,300 in 2007, the resultant annual cost to the Scottish economy of male unemployment due to alcohol dependency would be about £160 million[65].

8.42 However, using data in Table F.3, adjustments can be made to reflect that 89.2% of employed males work full-time, whilst 10.8% work part-time. Assuming that these proportions would apply to the estimated 6,006 males who are unemployed due to their alcohol dependency, and that part-time workers have half the earnings of full-time workers, the resultant annual cost to the Scottish economy due to unemployment in 2007 due to alcohol dependence would have been about £150.9 million[66]. This total disregards any other impacts of lower levels (below dependence/harmful) of alcohol misuse on male and/or female employment and unemployment. It should also be noted that the Scottish macroeconomic context in 2007 was very different from that of 1995, which reinforces the need to treat these figures with caution. However, the lack of relevant recent research in this area precludes more accurate estimates.

Approach 2: Based on Study by Cabinet Office Strategy Unit 2003

8.43 The Cabinet Office Strategy Unit (2003) used a different methodology from Catalyst, which was based on the findings of MacDonald and Shields (2004)[67]. When this approach was applied to Scotland by the Scottish Government (Scottish Government, 2008a), it suggested that the value of alcohol-related unemployment to the Scottish economy in 2001 was more likely to have been about £146 million (rather than the £84 million for 2001 derived by Catalyst, based on Approach 1).

8.44 When calculating the effect of alcohol misuse on unemployment, the Cabinet Office (Cabinet Office Strategy Unit, 2003) used data showing that male heavy drinkers (i.e. males drinking 50 plus units per week) spent an average of 11.4 days per annum out of employment. This estimate accounted for full-time and part-time male employment rates in England in the early 2000s.

8.45 It also used an estimated average of 8.1 days per year out of employment for female heavy drinkers (who were not included in the study by MacDonald and Shields, 2004). This estimate accounted for lower female participation rates and higher rates of part-time employment.

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[65] An excess of 6,066 unemployed males due to alcohol misuse at a loss of £26,300 each per year results in an annual loss of £159,537,846.

[66] £142,308,425 for full-time workers and £8,615,084 for part-time workers equates to £150,923,509.

[67] Their paper was published in 2004, but the Cabinet Office Strategy Unit used the forthcoming version in 2003. The data relate to the 1997 and 1998 Health Surveys of England.

8.46 The Cabinet Office study also linked these estimated days out of employment for heavy drinkers to a reduction in the probability of working for "problem drinkers" of 6.9%. This was the most conservative estimate in the work by MacDonald and Shields (2004), and was based on a definition of problem drinking as "drinks every day" when asked about the frequency of drinking in the Health Survey of England.

8.47 Applying these estimates of 11.4 days per annum out of employment to the assumed 110,293 economically-active, alcohol-dependent males and 8.1 days per annum out of employment to the assumed 62,813 economically-active, alcohol-dependent females in Scotland gives an estimated cost to the Scottish economy of unemployment due to alcohol dependence in 2007 of £191.5 million[68].

8.48 However, both of these estimates should be treated with considerable caution, as they are derived from data from England from the late 1990s and early 2000s (when the macroeconomic context was different) and rely on a variety of assumptions about alcohol dependency, its effects on rates of employment and unemployment, and the proportions of full-time and part-time employees.

8.49 Nevertheless, although both of these approaches have significant limitations, there is a lack of relevant recent published research on the effects of alcohol misuse on employment. Based on the above calculations, the estimate of the annual cost to the Scottish economy in 2007 of unemployment resulting from alcohol misuse is £150.9 million - £191.5 million, with a mid-point value of £171.2 million.

Premature Mortality

8.50 A different approach is required to calculate the effect of premature mortality due to alcohol misuse on the Scottish economy. The number of potential years of working life lost directly or indirectly due to alcohol misuse needs to be calculated. Then the earnings associated with these years (discounted to reflect their present value[69]) have to be calculated to reflect the cost of this lost productivity to the Scottish economy due to premature alcohol-related deaths in 2007.

8.51 There are two sources of data for the number of alcohol-related premature deaths in 2007:

- Alcohol Statistics Scotland 2009 (NHS National Services Scotland, 2009a);
- Alcohol attributable mortality and morbidity (NHS National Services Scotland, 2009b).

[68] £145,035,085 for males (1,257,338 lost days at £115.35 per day) plus £46,493,197 for females (508,785 lost days at £91.38 per day) equates to £191,528,281.

[69] Discounting is used to show the present value of a stream of money that is expected over a number of years in the future. It is used to reflect the fact that the present value of £1 at some future date is currently less than £1, as the lesser sum could be invested now to generate £1 in the future.

Approach 1: Using Data from Alcohol Statistics Scotland

8.52 The figures for alcohol-related deaths in 2007 in *Alcohol Statistics Scotland 2009* are based on data from the General Register Office for Scotland (GROS). These deaths are recorded using the World Health Organisation's International Classification of Diseases 10th Revision (ICD10)[70].

8.53 As shown in Table F.4a in Appendix F, there were 1,093 alcohol-related deaths (754 male and 339 female) of people aged 15-64 years with alcohol as the underlying cause in Scotland in 2007. There were also an additional 560 alcohol-related deaths (429 male and 131 female) amongst the same age group where alcohol was identified as a contributory cause of death. There were therefore a total of 1,653 alcohol-related deaths (1,183 male and 470 female) amongst people of working age in Scotland in 2007 according to this data source.

8.54 These data are presented by 5-year age bands in Table F.4a. Assuming all of deaths occur at the mid-point within each age band and that both men and women retire at 65 years of age, Table F.4b shows that total of 22,279 years of potential working life (15,764 male and 6,515 female) were lost due to the alcohol-related deaths in 2007. Table F.4c shows that 15,234 years of potential working life were lost due to deaths where alcohol was given as the underlying cause of death, whilst Table F.4d shows that 7,045 years of potential working life were lost by those for whom alcohol was a contributory cause of their death.

8.55 However, not all of these people who died prematurely due to alcohol misuse would have been in full-time employment, and adjustments need to be made to the numbers to reflect an assumed future employment rate of 80.2% for males and 73.8% for females (based on the 2007 rates shown in Table F.1). The average full-time annual earnings of £26,300 for males and £20,835 for females in 2007 also need to be adjusted to £24,880 for males and £16,751 for females to reflect that only 89.2% of the male workforce and 60.8% of the female workforce were in full-time employment. It is assumed that those who were employed part-time earned half the amount of full-time workers.

8.56 The resulting numbers were discounted at 3.5% (the rate currently recommended by HM Treasury) and are summarised in Table 8.3. The estimated cost to the Scottish economy in 2007 associated with the total loss of future earnings due to premature alcohol-related deaths in the working population in 2007 was £287.9 million. This total comprises £194.0 million due to those with alcohol as the underlying cause of their death and £93.9 million for those with alcohol as a contributory cause of their death.

[70] The specific codes used were F10, G31.2, G62.1, I42.6, K29.2, K70, K73, K74.0, K74.1, K74.2, K74.6, K86.0, X45, X65, and Y15.

Table 8.3: Estimated Costs to Scottish Economy in 2007 due to Alcohol-related Premature Mortality in 2007 (Approach 1)

	Alcohol as Underlying Cause of Death	Alcohol as Contributory Cause of Death	Any Mention of Alcohol as Cause of Death
Males	£150,156,273	£79,095,498	£229,251,772
Females	£43,867,774	£14,815,363	£58,683,138
Total	**£194,024,047**	**£93,910,861**	**£287,934,910**

8.57 This amount is slightly lower than the £328 million calculated for 2006 (Scottish Government, 2008a), which was based on 2,372 alcohol-related deaths in Scotland in 2004.

Approach 2: Using Data from Alcohol Attributable Mortality and Morbidity

8.58 The data reflecting premature mortality presented in the *Alcohol Attributable Mortality and Morbidity* report have been calculated by ISD Scotland by applying their age- and sex-specific alcohol population attributable fractions (PAFs) to the number of deaths for each cause by age and by gender to estimate mortality that was wholly or partly attributable to alcohol consumption in Scotland in 2003 (as recorded by GROS). Only those causes of deaths which have an alcohol attributable condition recorded as the underlying cause were included in the analysis. Mortality data were extracted for 2003 because that year corresponded to the latest prevalence estimates of population alcohol consumption in Scotland available at the time from the Scottish Health Survey (SHeS) 2003 (Scottish Executive, 2005)[71].

8.59 Table F.5a in Appendix F shows that, according to this data source, there were a total of 1,865 alcohol-attributable deaths (1,276 males and 589 females) amongst those aged 16-64 years in Scotland in 2003.

8.60 Given that there were a total of 11,390 deaths (7,091 males and 4,299 females) amongst this age group in 2003, these data suggest that about one-in-six of these deaths (16.4%) were attributable to alcohol (18.0% for males and 13.7% for females).

8.61 This PAF-based total of 1,865 alcohol-attributable deaths is higher than the total of 1,653 deaths (based on the GROS data for 2007 in Alcohol Statistics Scotland 2009) where alcohol was mentioned as either the underlying cause or a contributory factor (see Table F.4a).

[71] Although the estimates were calculated using the revised SHeS 2003 figures, which were published in 2008.

8.62 Undertaking similar adjustments (e.g. to reflect employment rates in 2007) and equivalent calculations with these data gives an estimated total loss of earnings due to premature alcohol-related deaths in the working population of £348.0 million (£274.1 million for males and £73.9 million for females), as shown in Table 8.4.

8.63 This value of £348.0 million is considerably higher than the loss calculated using the other data source for all alcohol-related deaths, but only slightly higher than the loss of £328 million calculated by Scottish Government for 2006 (Scottish Government, 2008a).

8.64 The above calculations take no account of the protective (i.e. beneficial) effects of alcohol consumption (e.g. by reducing cardiovascular disease). Alcohol attributable mortality and morbidity (NHS National Services Scotland, 2009b) includes estimates of deaths prevented as a result of alcohol consumption by age and gender. These estimates for the working age population are presented in Table F.6a in Appendix F, which shows that an estimated 254 deaths were prevented in 2003 in those aged 16-64 (216 for males and 38 for females).

8.65 Repeating the above calculations for Approach 2 using the adjusted numbers of deaths (see Table F.6b) gives an alternative estimated total loss of earnings due to premature alcohol-related deaths in the working population (adjusted to include the protective effects of alcohol consumption) of £313.3 million (£242.5 million for males and £70.8 million for females), as shown in Table 8.4.

Table 8.4: Estimated Costs to Scottish Economy in 2007 due to Alcohol-related Premature Mortality in 2007 (Approach 2)

	Costs based on numbers of premature deaths (in 2003) related to alcohol	Costs based on numbers of deaths (in 2003) adjusted for protective effects of alcohol consumption
Males	£274,122,011	£242,480,506
Females	£73,904,465	£70,795,068
Total	**£348,026,476**	**£313,275,574**

8.66 Both data sources for premature mortality have limitations. For example, the data based on attributable fractions relates to deaths in 2003, and determining the appropriate fractions for attributing is not an exact science. However, the GROS data are based on a more restrictive set of ICD10 codes. Both approaches are also dependent on the quality of the decisions identifying the recorded causes of death. Excluding any protection effects of alcohol, the costs to the Scottish economy in 2007 due to the premature mortality of those of working age were £287.9 million - £348.0 million, with a mid-point of £318.0 million. This mid-point value is also similar to the value using attributable fractions after adjusting for the protective effects of alcohol consumption.

Limitations and Summary of Costs

8.67 The above calculations have a number of limitations, due to the shortcomings of some of the data and a number of the underlying assumptions. For example, there is a lack of recent published studies relating to several of the aspects, which in turn has restricted the formulation of appropriate assumptions.

8.68 For example, the data on presenteeism and absenteeism are largely based on estimates that may be inappropriate for the working environment in Scotland in 2007. Calculations of lost earnings are based on average values, which would be over-estimates if workers with alcohol-related problems tend to be concentrated in relatively low-paid jobs.

8.69 A lack of information about the effects of alcohol misuse on unemployment means that the calculations relating to the impact of unemployment are also based on estimates that may be inappropriate for the Scottish context in 2007.

8.70 The calculations about premature mortality are more robust (assuming that people who consume alcohol have similar employment prospects as the total working population), but are dependent on the accuracy of the estimated numbers of premature deaths attributable to alcohol amongst those of working age. Such numbers are highly dependent on the accuracy of the recording of the cause(s) of death.

8.71 However, using the alcohol-attributable mortality derived from PAFs (as presented in NHS National Services Scotland, 2009b) requires using PAFs that have been applied to 2003 mortality figures (which are now out-of-date). PAFs could also change over time due to changes in population prevalence, age and sex and of drinking at particular levels (NHS National Services Scotland, 2009b).

8.72 Nevertheless, the estimates presented in this section give an indication of some of the potential costs of alcohol misuse to the productive capacity of the Scottish economy in 2007, and of their comparative magnitudes. These are summarised in Table 8.5, which shows that premature death generates the largest economic impact. The estimated cost to the productive capacity of the Scottish economy in 2007 due to alcohol misuse is £725.2 million - £1,006.1 million. The “Best Estimate”, which is based on sum of the mid points of the calculated ranges, is £865.7 million.

Table 8.5: Estimated Costs (£ million) to Productive Capacity of Scottish Economy Due to Alcohol Misuse in 2007

Resource Category	Units	Cost 2007/08
Presenteeism	1,523,880 lost days	Mid-point: £185.1 million Range: £177.0 million - £193.1 million
Absenteeism	1,576,544 lost days (range: 900,882 – 2,252,205)	Mid-point: £191.5 million Range: £109.4 million - £273.5 million
Unemployment	Approach 1) Excess male unemployment of 5.5% Approach 2) 1,766,123 lost days	Mid-point: £171.2 million £150.9 million £191.5 million
Premature Death – excluding protective effects of alcohol consumption	1,653 (GROS data) - 1,865 (PAF data) premature deaths 22,279 - 28,365 potential years of working life lost	Mid-point: £318.0 million Range: £287.9 million - £348.0 million
Premature Death – including protective effects of alcohol consumption	1,611 premature deaths (PAF data) 26,035 potential years of working life lost	£313.3 million
TOTAL	***"Best Estimate" (sum of mid-points)***	***£865.7 million***
	Range:	**£725.2 million - £1,006.1 million**

9 WIDER COSTS

Summary

- Previous studies of the costs of alcohol misuse indicate that there is not an agreed methodology for estimating the wider costs to society and/or the economy.
- This study focuses on estimating the costs associated with three elements, all of which as based on the cost consequences associated with premature mortality due to alcohol-related causes.
- Costs are estimated for the value of the activities that would have been undertaken prior to retirement by those people misusing alcohol not participating in the workforce who died prematurely – these are estimated to be worth £52.0 million - £63.8 million (£34.5 million - £41.4 million for males and £17.5 million - £22.4 million for females).
- Costs are also estimated for the value of the time that would have been available in the years between retirement and expected lifespan for everyone dying prematurely due to alcohol-related causes - these years are estimated to be worth £96.6 million - £110.5 million (£61.1 million – £65.1 million for males and £35.5 million - £45.4 million for females).
- The human costs associated with premature mortality are estimated for each year of life lost prematurely due to alcohol misuse – using a value of £30,000 per life year resulted in estimated human costs (which include pain, grief and suffering) of £882.5 million - £1,034.2 million; using a value of £50,000 per life year results in equivalent estimates of £1,470.8 million - £1,723.7 million.
- The total value of the wider costs associated with alcohol misuse are estimated to be in the range of £1,031.1 million - £1,898.0 million, with a mid-point estimate of £1,464.6 million.

Introduction

9.1 This section considers some of the wider costs associated with alcohol misuse in Scotland in 2007 not included in the previous analysis. The treatment of these costs varies considerably between studies, but tends to focus on the "human" (or intangible) costs associated with alcohol misuse.

9.2 It focuses on the costs associated with aspects relating to premature mortality:

- The value of non-paid work that would have been undertaken by non-participants in the workforce prior to the age of retirement (i.e. 65 years);
- The value non-paid work that would have been undertaken between retirement age and expected lifespan;
- The intangible social costs (human costs) associated with premature death.

9.3 Several dimensions are explored relating to the intangible social costs associated with premature death:

- All premature deaths related to alcohol recorded in the data sources considered in Section 8;
- Premature deaths brought about through alcohol-related homicide;
- Premature deaths arising from alcohol-related fires;
- Premature deaths arising form alcohol-related road traffic accidents.

Treatment of Wider Costs in Previous Studies

9.4 The Catalyst study (Scottish Executive, 2001) considered three broad aspects of alcohol misuse:

- The health and social impact;
- The cost of premature mortality for the non-working population;
- The human costs of morbidity due to alcohol misuse.

9.5 However, the Catalyst study (Scottish Executive, 2001) was only able to quantify the cost of the premature mortality of the non-working population (based on estimated working life years lost).

9.6 The English study by the Cabinet Office (Cabinet Office Strategy Unit, 2003) discussed two aspects of the human costs of alcohol misuse:

- The human costs of alcohol-related morbidity;
- The human costs of alcohol-related mortality.

9.7 The Cabinet Office (Cabinet Office Strategy Unit, 2003) considered both of these aspects but did not place a financial value on either of them, arguing that "*neither the intangible cost of morbidity due to alcohol misuse nor the intangible value of life for all alcohol-related deaths are quantifiable*".

9.8 The international guidelines for estimating the costs of substance abuse (Single *et al.*, 2003) discussed the treatment of non-workforce mortality and morbidity as part of its analysis of productivity costs. The authors identified the tangible costs due to the premature mortality resulting from substance abuse of the employed as comprising loss of paid output and loss of unpaid output. The tangible costs due to the premature mortality of the unemployed or out of work only comprise the loss of unpaid output. Single *et al.* (2003) identify the intangible costs due to the premature deaths of both the employed and the unemployed/out of work as a reduction in consumption and the value of life.

9.9 The literature review and the modelling work on the effects of alcohol pricing and promotion undertaken for the Department of Health in England by the University of Sheffield (Booth *et al.*, 2008; Brennan *et al.*, 2008b) did not consider the financial impacts of premature mortality (either for those in employment or for those not in the workforce).

9.10 The Scottish Government considered several possible human costs attributable to alcohol misuse in 2006/07 (Scottish Government, 2008a). These included estimates for:

- Consequences of crime: £145 million in 2006/07;
- Homicide: £51 million;
- Deaths in fires: £23 million;
- Excess mortality (i.e. premature mortality in the non-working population): £248 million (based on updating the 2001 estimate);
- These four elements give a total for the human cost attributable to alcohol misuse in 2006/07 of £446 million.

9.11 However, the report (Scottish Government, 2008a) also stated that "*neither the intangible cost of morbidity due to alcohol use or the intangible value of premature mortality is presented here*", due to various caveats surrounding the estimation of intangible costs.

9.12 The above-mentioned caveats were linked to a study by the National Social Marketing Centre on *The Societal Costs of Potentially Preventable Illnesses: A Rapid Review* (Lister *et al*., 2006). This study briefly considered the cost of illnesses associated with alcohol misuse; smoking; obesity; cardio vascular disease; lung cancer; HIV/AIDS; and mental health. It considered the total societal cost of these aspects in terms of:

- The cost to individual households;
- Cost to public health/care;
- Costs to other public services;
- Costs to employers;
- Intangible social costs.

9.13 Lister *et al.* (2006) concluded that there were many gaps and inconsistencies in the available evidence[72] and that "*the total cost implications for society are considerably greater than indicated by most previous studies*". They also include a discussion of estimating intangible costs. With regard to calculating the costs alcohol misuse, they updated the Cabinet Office study (Cabinet Office Strategy Unit, 2003) using data for England for 2005.

9.14 This brief summary of the treatment of wider costs in previous studies shows that wider costs of alcohol misuse have not been treated in a consistent way in previous studies, with estimating values for intangible costs proving to be especially difficult.

Estimating Intangible Costs

9.15 To estimate the intangible social costs associated with premature mortality due to alcohol misuse, it is necessary to identify a value per life year that can then be applied to the foregone years of life. There a several possible approaches to deriving such an estimate.

[72] Indeed, the authors state that "*we were frankly surprised by the gaps and inconsistencies in the available evidence*".

9.16 One approach is to use the value of per capita GDP in the year of death to each year lost. Scottish GDP per capita in 2007 was £22,024[73].

9.17 Another approach is to use a value based on that used for threshold quality adjusted life years (QALYs) by the National Institute of Health and Clinical Excellence (NICE). The most recent guidelines for undertaking technology appraisals (NICE, 2008) suggests using a range per QALY of £20,000 - £30,000 for the threshold value (as it has done throughout the 2000s). Based on the recognition that the value of a QALY relates to a year of life lived in full (or perfect) health, and that, on average, most people enjoy about 80% of full health each year, an upper value of about £24,000 per life year seems plausible.

9.18 The Catalyst study (Scottish Executive, 2001) used data from the (then) Department of the Environment, Transport and the Regions (DETR) on the willingness to pay (WTP) to prevent a road fatality, calculating a life year valuation of £27,022 at 2001/02 prices. Updating to 2007/08 values using the GDP deflator (HM Treasury, 2009) gives a life year valuation of £31,774. However, it should be noted (as stated above) that neither the Catalyst study (Scottish Executive, 2001) nor its most recent update (Scottish Government, 2008a) included quantitative estimates of the intangible costs (based on such WTP estimates) in their cost calculations.

9.19 Lister *et al.* used a cost of £31,750 (which is similar to the (updated) Catalyst-based value of £31,774) per quality adjusted/disability adjusted life year (i.e. per QALY/DALY) to represent the intangible human costs of premature mortality in 2005. This value is derived from a discussion of estimating a monetary valuation per QALY in a paper on the economic and social costs of mental illness (The Sainsbury Centre for Mental Health (SCMH), 2003)[74], where a value of £30,000 was used.

9.20 A range of values for a QALY is currently in use across UK Government Departments, from a lower value of £30,000 per QALY to an upper value of £80,000 per QALY. The recent report by the University of Sheffield on minimum pricing for alcohol in Scotland (Purshouse *et al.*, 2009) uses values of £50,000 and £80,000 per QALY. The former value, which is in line with current Department of Health (DH) practice (e.g. it has been used by the DH

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[73] UK GDP in 2007 per capita, based on a population of 60,975,000, was £22,942. Scottish GPD per capita is estimated to be 96% of the UK value (see www.Scotland.gov.uk/Resource/Doc/923/0055551.pdf).

[74] The SCMH paper identified a monetary value of a QALY as being in the region of £30,000. Whilst recognising that "*the empirical base for this figure is far from secure*", it cites two pieces of supporting evidence. One justification is that it appears to be "*broadly consistent with the value of life, or – more accurately – the value of a prevented fatality*" used by the DETR in the appraisal of transport safety. The other justification is that a value in the region of £30,000 is the approximate threshold or cut off rate used by the National Institute for Health and Clinical Excellence when assessing health service interventions and procedures (as included, for example, in the NICE guides to the methods of technology appraisal, 2004 and 2008). Further discussion is included in the SCMH (2003) paper.

in recent policy impact assessments[75]) and was used in relation to alcohol by Brennan *et al.*, 2009, applied to health-related QALYs. The latter, which is consistent with Home Office practice, related to crime-related QALYs[76].

9.21 Based on the above discussion, two potential values for a life year were identified to use when estimating a value for intangible costs in this study:

- £30,000 based on the upper threshold 'rule-of-thumb' QALY used in England by NICE in recent years (supported by the DETR estimate based on WTP of £31,774);
- £50,000 based on the views of the Department of Health.

9.22 Both values have their shortcomings, but (unlike in other studies) they do enable monetary values to be estimated for the intangible costs associated with premature mortality due to alcohol misuse. It should be noted, however, that focusing only on premature deaths excludes any consideration of the intangible costs borne by those who misuse alcohol (and by their families and friends) whilst they are alive, so the calculated intangible costs are likely to be underestimates.

The Adopted Approach to Estimating the Wider Costs of Alcohol Misuse

9.23 Due to various data limitations already identified, this current study adopts a pragmatic approach to estimating wider costs of alcohol misuse by focusing on the costs associated with premature mortality not covered elsewhere in the analysis. Alcohol misuse also has many health and social impacts, some of which are identified in previous studies[77], but none of these are quantified or discussed further in this section (though some aspects are captured elsewhere in the report).

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[75] See, for example, Impact Assessment on restricting the sale of tobacco a the point of sale: May 2009 (http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_100258.pdf); and Impact Assessment of mandatory age restriction technology for prohibition for tobacco vending machines: January 2009 (http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_093815.pdf)

[76] Though it should be noted that this latter value is based on a willingness-to-pay estimate to avoid some specific consequences of a road injury derived from data collected in 1997 (Carthy *et al*. 1999).

[77] These include the effects on children of parental misuse of alcohol (e.g. prenatal effects, such as foetal alcohol syndrome; susceptibility to psychiatric problems, such as depression and male teenage suicides; substance misuse; and behavioural problems (such as truancy and anti-social behaviour); plus neglect and the need for child protection); break-down of relationships (e.g. divorce); domestic violence; homelessness and rough sleeping; and sexual health (e.g. unprotected sex resulting in unwanted pregnancies and/or sexually transmitted diseases). It should be noted that the direction of causality is not always clear. These are likely to impose a significant on-going cost burden to society, but this cannot be estimated.

9.24 Two sources of estimates of the numbers of premature deaths (including the ages at which these deaths occurred) are used for the calculations – those based on GROS data with any mention of alcohol (referred to hereafter as GROS-AMA) and those based on alcohol attributable fractions (hereafter AAFs).

9.25 The costs of premature mortality to the productive capacity of the Scottish economy in 2007 were considered in Section 8. This current section focuses on:

- The lost value of non-paid work and activities that would have been undertaken prior to retirement age by people who were not part of the workforce had they not died prematurely due to alcohol-related causes;
- The lost value of non-paid work and activities that would have been undertaken between retirement age and expected lifespan by everyone who died prematurely due to alcohol-related causes;
- The intangible social costs (e.g. pain, grief and suffering) associated with the total life years lost through premature death due to alcohol-related causes.

Value of non-paid work undertaken by non-participants in workforce prior to retirement

9.26 The value of the lost output that would have been produced prior to retirement by those who died prematurely during 2007 due to alcohol misuse was considered in Section 8. The calculations were based on the counter-factual assumption that, in the absence of alcohol, those dying prematurely due to alcohol misuse would have exhibited that same workforce participation characteristics as the Scottish population as a whole (see Appendix G). The numbers of non-participants in the workforce are derived from these data, indicating that 19.8% of males and 26.2% of females were not in employment.

9.27 The value of unpaid work and activities undertaken by those in employment is not considered in the analysis, which only considers the value of the time when the non-participants in the workforce could otherwise have been employed at work (i.e. the value of all "leisure" time is excluded for all premature deaths).

9.28 In the absence of alcohol (and their resultant premature death), it is assumed that these non-participants in the workforce would have undertaken a variety of unpaid work and activities (e.g. childcare, domestic activities, and community and voluntary work) during their "working" hours. It is therefore necessary to place a value on this time.

9.29 As shown in Table F.2a, the occupational group in Scotland with the lowest median weekly earnings in April 2007 was Sales and Customer Service Occupations, with an overall figure of £268.80 per week. This wage level was considered to be the most appropriate proxy for the value of the time spent on unpaid work and activities by non-participants in the workforce. As with the wages of those in employment, this was uplifted by 4.6% to reflect the average increase in earnings during 2007/08, to give a median weekly wage for this occupational group of £281.16. The median weekly earnings for

males in this occupational group were £290.68 (£277.90 uplifted by 4.6%) and £270.60 (£258.70 uplifted by 4.6%) for females. Converting these to annual values (based on 52.14 weeks per year) give £15,157 for males and £14,110 for females.

9.30 These annual values were applied to the premature years of life lost (based on both estimates) prior to retirement age (assumed to be 65 for males and for females) to represent the value of the activities that would have been undertaken by those not in the workforce (discounted at 3.5%). The results are shown in Table 9.1.

Table 9.1: Lost value of non-paid work and activities that would have been undertaken prior to retirement age by people who were not part of the workforce

	Alcohol-related Premature Mortality from GROS-AMA	Alcohol-related Premature Mortality from AAFs
Males	£34,480,209	£41,411,880
Females	£17,548,327	£22,391,921
Total	£52,028,538	£63,803,801

9.31 The resultant (discounted) value for the lost activity due to the life years lost prior to retirement age by those not in the workforce who died prematurely in 2007 due to alcohol misuse was £52.0 million - £63.8 million. (£34.5 million - £41.4 million for males and £17.5 million - £22.4 million for females), with a mid-point of £57.9 million.

Value of non-paid work undertaken between retirement and expected lifespan

9.32 It can also be argued that the years of life lost through premature-alcohol-related mortality after retirement age (i.e. after 65) should be assigned a value. Although it is assumed that (in the absence of their deaths due to alcohol) these people would not have been in paid employment after the age of 65, they would have been undertaking other activities (e.g. caring for a spouse or grandchildren; domestic activities; community and voluntary work), to which a value can be assigned.

9.33 Based on the above discussion for those not in the workforce prior to the age of 65, a value of £7,330 per year is used for males and for females. This is based on annualising half of the mean weekly earnings of £281.16 (£268.80 uplifted by 4.6%) for everyone working in Sales and Customer Service Occupations (i.e. the occupational group in the ASHE with the lowest earnings). The same value is used for males and females after the age of retirement as it is assumed that their unpaid work after the age of 65 is of equal value, whereas prior to retirement age, due to wage differentials, the opportunity cost of not working was higher for males than for females.

9.34 The analysis assumes that life expectancy in Scotland is 75 years for men and 80 years for women[78]. Using these ages and GROS-AMA data shows that males dying prematurely due to their alcohol misuse lost a total of 13,932 years after the age of 65 and females lost 8,684 years (i.e. a total of 22,616 years). Using AAF-based estimates of premature mortality gives an equivalent total of 25,446 lost years (14,455 for males and 10,991 for females).

9.35 Table 9.2, which is based on a value of £7,330 per lost year and discounting at 3.5%, shows a total associated with the non-paid work and activities that would otherwise have been undertaken between the age of retirement and expected lifespan by those who died prematurely of £96.6 million - £110.5 million (£61.1 million – £65.1 million for males and £35.5 million - £45.4 million for females)[79], with a mid-point of £103.6 million.

Table 9.2: Lost value of non-paid work and activities that would have been undertaken post retirement until expected lifespan

	Alcohol-related Premature Mortality from GROS-AMA	Alcohol-related Premature Mortality from AAFs
Males	£61,081,353	£65,121,359
Females	£35,520,241	£45,418,347
Total	£96,601,594	£110,539,706

Intangible social costs (human costs) associated with premature death

9.36 As discussed above, due to the recognised difficulties associated with calculating intangible, this study has identified two values for a year of life - £30,000 per year and £50,000 per year. These values were used to estimate the intangible social costs (the human costs) associated with all of the premature life years lost due to alcohol-related causes (assuming a life expectancy of 75 years for men and of 80 years for women).

[78] These figures may be slightly high, given that GROS data on life expectancy in 2005-2007 (GROS, 2008) indicated that males born in this period would have a life expectancy of 74.85 years and women would expect to live for 79.75 years. However, they are in line with the life expectancy of those who have reached adulthood (e.g. a 20-year old male in 2005-07 would have expected to live to 75.61 years, and a 20-year female to 80.32 years).

[79] Given that the AAF approach to calculating premature mortality results in more premature deaths than the GROS estimates, a greater difference might be expected for males than is shown in Table 9.2. However, the AAF-based estimate of 1,886 premature deaths amongst males (compared with 1,687 using GROS data) shows higher proportions of these deaths as occurring at relatively young ages (i.e. in males aged 44 or less). The discounting process gives greater weight (i.e. a higher present value) to payments in the near future than the distant future, which brings the two estimates for males closer together. This effect is not apparent for females, as the AAF estimates for premature mortality always exceed those based directly on GROS data.

9.37 Using the GROS-AMA data for premature deaths, a total of 52,742 lost life years (35,908 for males and 16,834 for females) were identified for the 2,190 premature deaths (1,537 for males and 653 for females) due to alcohol misuse in 2007. The AAFs data give an estimate of 63,252 lost life years (40,876 for males and 22,376 for females) for the 2,526 premature deaths (1,615 for males and 911 for females).

9.38 The intangible costs associated with premature mortality due to alcohol misuse are shown in Table 9.3.

Table 9.3: Costs of premature mortality: intangible social (human) costs associated with premature life years lost

	Value of Life Year = £30,000		Value of Life Year = £50,000	
	Alcohol-related Premature Mortality from GROS-AMA	**Alcohol-related Premature Mortality from AAFs**	**Alcohol-related Premature Mortality from GROS-AMA**	**Alcohol-related Premature Mortality from AAFs**
Males	£594,669,209	£664,634,416	£991,115,348	£1,107,724,026
Females	£287,782,280	£369,579,679	£479,637,134	£615,966,132
Total	£882,451,489	£1,034,214,095	£1,470,752,482	£1,723,690,159

9.39 Applying a value of £30,000 to every year of life lost through premature mortality due to alcohol-related causes in Scotland in 2007, and discounting at 3.5%, gives a total value of £882.5 million - £1,034.2 million for the associated intangible human costs. This value comprises £594.7 million - £664.6 million for males and £287.8 million - £369.6 million for females. Applying a value of £50,000 to every year of life lost gives a total value of £1,470.8 million - £1,723.7 million for the associated intangible human costs. This value comprises £991.1 million - £1,107.7 million for males and £479.6 million - £616.0 million for females.

9.40 Based on these ranges, the mid-point value is £1,303.1.

Other Aspects Relating to Wider Costs

9.41 Appendix G considers the costs specifically associated with alcohol-related house fires, alcohol-related road traffic accidents (RTAs) requiring a response by one or more fire engines, premature mortality resulting from RTAs associated with illegal alcohol levels, and premature mortality resulting from alcohol-related homicides.

9.42 The main points from Appendix G are:

- Figures from research carried out in Ireland suggest that approximately half of fatalities resulting from accidents may be alcohol-related;
- Estimates (based on figures from the Office of the Deputy Prime Minister's report on the economic cost of fire) suggest that the costs associated with fires in which alcohol was a direct or an indirect factor are in the region of £664,704;
- The cost of Fire Service attendance at alcohol-related road traffic accidents (RTAs) that result in fatalities is estimated to be £510,857[80];
- Using Department for Transport costs, the premature mortality cost in relation to house fires in which alcohol misuse was either a direct or an indirect factor is estimated to be £36,269,592;
- Using Department for Transport costs, the premature mortality cost associated with RTAs involving drivers/riders with illegal alcohol levels is estimated to be £45,336,990.
- The costs of premature mortality resulting from alcohol-related homicides are estimated as £25,055,441 - £41,759,068, based on the value of a life year of £30,000 and £50,000 respectively.

9.43 The alcohol-related premature deaths associated with fires, RTAs and homicides considered in Appendix G are unlikely to have been included in the data on premature deaths from GROS-AMA (due to the way these are calculated). However, these aspects are likely to be included in the calculations of AAFs. The above costs relating to premature mortality are therefore reported for interest and completeness, but they are not added to the other costs associated with premature mortality considered in this section, as this would result in some double counting with respect to the AAF-based calculations.

Limitations and Summary of Costs

9.44 There are several limitations associated with the above calculations and their underlying assumptions. For example, the calculations only focus on those who died prematurely in 2007 due to their alcohol misuse and exclude the wider costs (including intangible costs) experienced by those with alcohol-related problems during the year who did not die prematurely that year.

9.45 The calculations are based on the assumption that those who died prematurely due to alcohol misuse shared the same characteristics as the population as a whole, which is a potential limitation.

[80] This gives a total estimate of £1,175,561 for costs associated with fires in which alcohol was a direct or an indirect factor and the cost of Fire Service attendance at alcohol-related RTAs resulting in fatalities.

9.46 The annual values assigned to the activities that would have been undertaken prior to retirement age by those dying prematurely who were not participating in the workforce are arbitrary (but are related to minimum levels of pay that have been foregone by not working). The annual value assigned to the activities that would have been undertaken between retirement age and life expectancy by everyone dying prematurely are also arbitrary (but related to the values above). The calculations also exclude the values of activities undertaken outwith "working hours" by full-time and part-time members of the workforce.

9.47 Nevertheless, unlike many earlier studies, this study does attempt to capture and value the wider intangible social costs associated with alcohol misuse. It also includes estimates of the values of activities that would have been undertaken pre-retirement age by non-workforce participants and value of the activities that would have been undertaken post-retirement by those dying prematurely from alcohol misuse.

9.48 The findings for this section are summarised in Table 9.4, which shows that the wider costs associated with alcohol misuse are estimated to be in the range of £1,031.1 million - £1,898.0 million, with a mid-point estimate of £1,464.6.

Table 9.4: Summary of wider costs associated with alcohol misuse

Category	Cost
Costs of premature mortality: value of lost activity prior to retirement by non-participants in workforce	Midpoint: £57.9 million Range: £52.0 million - £63.8 million
Costs of premature mortality: value of lost activity post-retirement and prior to life expectancy	Midpoint: £103.6 million Range: £96.6 million - £110.5 million
Costs of premature mortality: intangible social/human costs associated with life years lost	Midpoint: £1,303.1 million Range: £882.5 million - £1,723.7 million
TOTAL WIDER COSTS	**Midpoint: £1,464.6 million** **Range: £1,031.1 million - £1,898.0 million**

10 DISCUSSION

10.1 Alcohol affects all of the Scottish population either directly or indirectly. It plays a key role in enhancing the social life of many and its manufacture also has a positive role in terms of employment and income generation for Scotland. However, for some people, alcohol can either be responsible for, or a contributory factor in, causing harm to individuals, their families, friends and society as a whole.

10.2 Alcohol misuse can be associated with social, psychological and health problems. Moreover, it can be difficult to identify the exact contribution that alcohol misuse makes to an outcome in the presence of these confounding factors. Indeed, in some situations there is uncertainty as to whether the presence of a confounding factor may have led to alcohol misuse or vice versa.

10.3 Cost-of-illness studies provide information about patterns of resource use associated with a particular condition. This information can help decision-makers by improving their understanding of the possible implications of resource allocation. However, unlike cost effectiveness and cost utility studies, cost-of-illness studies are unable to directly inform decisions about whether resource allocation for particular interventions are effective or cost effective.

10.4 Any cost-of-illness study (including those relating to alcohol misuse) is limited by the availability of information. Furthermore, it is important to note that the costs estimated in this study often reflect past levels of resource use and methods of practice. It should also be understood that, even if all alcohol misuse stopped immediately (thus preventing any additional adverse consequences), the impact of historic alcohol misuse would still be felt by society, often for many years. For example, health problems that have arisen from alcohol misuse may continue to impose a cost for the lifetime of individuals.

10.5 The estimates derived in this study should not be considered as the total cost of alcohol misuse in Scotland. Some costs associated with alcohol misuse have not been included, for example alcohol misuse resulting in unwanted pregnancies, and child alcohol misuse resulting in exclusion from school and limited educational achievement.

10.6 Moreover, it should be stressed that the generated costs are estimates which are often based on assumptions rather than documented statistics. Where possible, assumptions have been based on published evidence, however, in other instances pragmatic assumptions have had to be employed. Even where published evidence is available, this is often dated and/or generated in countries other than Scotland, whose economies and societies may differ from Scotland's situation (e.g. attitudes to being absent from work for alcohol-related reasons).

10.7 Additionally, in some cases it is not clear whether the estimate might over-value or under-value the true cost. For example, there is currently no consensus on the value of a life and different QALY values (ranging from £20,000 - £80,000 per QALY) are being used by different public sector bodies. As the upper figure is four times that of the lower figure the choice of quality of life value used in generating estimates in relation to premature mortality will heavily impact on the magnitude of this cost estimate.

10.8 In cases where there is uncertainty around assumptions, a conservative approach has been taken and, wherever possible, estimates have been generated under more than one assumption.

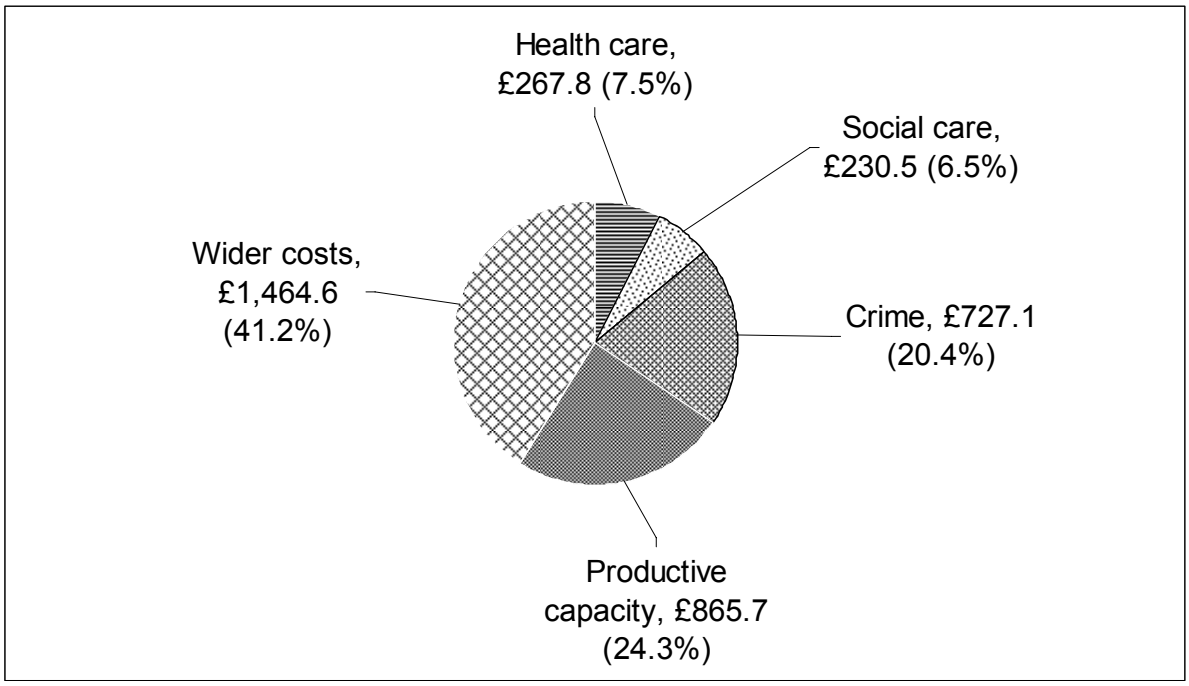
10.9 The distribution of costs under the main resource categories is shown in Table 10.1 and Figure 10.1. The table provides a summary of the lower, upper and mid-point estimates for these resource categories and the figure illustrates their percentage shares.

10.10 The figure shows that (under the assumptions used in this study) the combined productive capacity costs to the economy and the wider societal costs comprise nearly two-thirds of the total cost of alcohol misuse borne by society in Scotland during 2007.

Table 10.1: Distribution of annual costs by main resource category in Scotland (2007 estimates)

	Annual cost (£ million)	
Resource	**Range**	**Mid-point**
Health care	143.6 – 392.8	267.8
Social care	114.2 – 346.8	230.5
Crime	462.5 – 991.7	727.1
Productive capacity of the Scottish economy	725.2 – 1,006.1	865.7
Wider social costs	1,031.1 – 1,898.0	1,464.6
TOTAL OVERALL TOTAL	**2,476.6 – 4,635.4**	**3,555.7**

Figure 10.1: Distribution of annual societal cost (mid-point values) of alcohol misuse in Scotland for 2007 (£ million)



10.11 In conclusion, alcohol misuse imposes a substantial burden on Scottish society, costing between about £2,476.6 million and £4,635.4 million per year at 2007/08 prices. Based on the mid-point of this range, 7.5% of costs are due to health service expenditure, 6.5% to social work services, 20.4% to crime, 24.3% to productive capacity, and 41.2% to wider social costs. In terms of the statutory agencies, alcohol misuse imposes the greatest burden on the health care system, followed by social care services.

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APPENDIX A: AN OVERVIEW OF COST-OF-ILLNESS STUDIES

Cost-of-illness (COI) studies (which are sometimes known as burden-of-illness studies) were among the first economic studies to appear in the literature[81]. Their first mention in modern bibliography dates back to 1920, and COI studies became increasingly popular in the 1950s and 1960s. They analyse the total costs incurred by a society due to a specific disease or health condition (e.g. cardio-vascular disease). According to Jefferson *et al.* (2000), "*the aim of COI studies is descriptive: to itemise, value, and sum the costs of a particular problem with the aim of giving an idea of its economic burden*". This requires recognising, identifying, listing, measuring and valuing the costs generated by an illness.

COI studies can adopt either a *prevalence* method or an *incidence* method. The *prevalence* method considers the costs associated with all of the affected patients in relation to a specific period; the *incidence* method only takes account of patients who have fallen ill during the period. Costs occurring outwith the period of time under consideration (e.g. a specific financial year) will need to be discounted to reflect their present value.

COI studies generally examine the following costs:

- *Direct costs* – borne by the healthcare system, community and family in directly addressing the problem;
- *Indirect costs* – mainly productivity losses to the national economy caused by the problem or diseases, borne by the individual, family, society, or by the employer.

They may also include *intangible costs*, which are usually the costs of pain, grief and suffering and loss of quality of life. However, these cannot be quantified directly in monetary terms[82] and have seldom been included in such studies. For example, Roux and Donaldson (2004)[83] state that:

> *"In general, …, COI studies focus primarily on estimating direct, disease-specific health care-related costs and, occasionally, will include secondary costs related to paid and unpaid lost productivity, or indirect costs. The latter form part of the welfare losses to society incurred by diseases. The remaining welfare losses are represented by the losses in healthy time resulting from pain and suffering caused by diseases, though these aspects are rarely, if ever, valued in monetary terms."*

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[81] Jefferson T, Demichili V and Mugford M (2000). *Elementary Economic Evaluation in Health Care*, Second Edition, BMJ Books.

[82] The two methods available are the willingness-to-pay approach and Quality Adjusted Life Years (QALYs).

[83] Roux L and Donaldson C (2004). Economics and Obesity: Costing the Problem or Evaluating Solutions? *Obesity Research*, Vol 12; No. 2: February 2004.

Considering the costs associated with misuse of illicit drugs and/or alcohol opens up some additional dimensions. COI studies are sometimes considered as comprising *tangible* and *intangible* costs. In disease-specific COI studies, the tangible costs are generally the comprising (direct) costs related to health care and the (indirect) costs associated with lost productivity and premature mortality. However, in studies of the costs associated with substance misuse, the direct costs include a wider range of social costs, such as the associated costs relating to social services; law enforcement and criminal justice costs; property destruction; and research, policy and prevention. However, intangible costs – or quality of life losses – due to death, pain, suffering and distress (for users and/or their dependents and/or their crime victims) are generally not included in the cost estimates associated with illicit drug or alcohol misuse. For example, in their paper on how cost-of-illness studies can be made more useful for illicit drug policy analysis, Moore and Caulkins (2006)[84] write that:

> *"Intangible costs are non-market effects borne by individuals, such as pain and suffering. In theory, COI studies try to include indirect and intangible costs; in practice, they omit many as too difficult to estimate".*

Although recent years have seen some increasing interest in the concept of welfare loses associated with illness and disease, this remains sporadic. For example, a systematic review of the methodological considerations in cost of prostate cancer studies (Molinier *et al*. 2008)[85] identified fifteen studies that met their inclusion criteria. Only two of these studies, however, quantified some of the indirect costs associated with prostate cancer.

It is important to have a clear understanding of the policy question underpinning a COI study. Traditionally, COI studies have been used to compare the 'burdens' of different diseases both nationally and internationally. Although they are not economic evaluations in the strict sense, they can inform choices in resource allocation by estimating resource consequences of health problems in relation to each other. Such studies can therefore help to focus society's attention on health and assist some aspects of the decision-making process. As Roux and Donaldson (2004) state:

> *"Essentially, for priorities to be set, the key question is not "which health problem results in a greater burden?" but, rather, "what intervention aimed to treat this problem is the best buy?". COI data may assist in mobilising interest and resources to a particular problem, may be useful when attempting to extend beyond trial data to determine the magnitude of future health care cost savings from an intervention, as a source of "reference costs", and, perhaps, to monitor the identification of new threats to health by relating population health to risk factors. However, COI evaluations are not likely to be useful for setting priorities for investments in research or treatment and prevention of disease."*

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[84] Moore TJ and Caulkins JP (2006). How Cost-of-Illness Studies can be Made More Useful for Illicit Drug Policy Analysis. *Applied Health Economics and Health Policy* 2006: 5(2): 75-85.

[85] Molinier L, Bauvin E, Combescure C et al. (2008). Methodological Considerations in Cost of Prostate Cancer Studies: A Systematic Review. Value in Health 2008; 11(5); 878-885.

Clabaugh and Ward (2008)[86] recently undertook a systematic review of 52 COI studies in the United States to examine the methods used by researchers in developing COI studies. They focused on approaches used in literature in terms of perspective, scope, components of care analysed in the literature, data sets, and valuation approaches used for direct cost and concluded that:

> *"Analysing cost of illness presents useful opportunities for communicating with the public and policy makers on the relative importance of specific diseases and injuries".*

However, they also found that:

> *"COI studies employ varied approaches and many articles have methodological limitations. Without well-accepted standards to guide researchers in their execution of these studies, policymakers and the general public must be wary of the methods used in their calculation and subsequent results".*

The COI methodology has been criticised over the years for a variety of reasons. For example, it takes into account only the costs of resources but not the utility gain of reducing the illness. The approach does not compare alternative uses of resources and therefore may not adequately measure opportunity costs. It does not define choices and cannot help directly in making them. It can place over-reliance on average rather than marginal costs, which can lead to a systematic over-estimation of the size of the burden. Furthermore, some of the methods used for calculating indirect costs are questionable.

Nevertheless, Moore and Caulkins (2006) conclude in their paper on making COI studies relating to illicit drugs more useful that, providing some changes are introduced (e.g. taking a less 'conservative' approach to estimating social costs; addressing intangible costs and crime costs):

> *"… the problems with COI studies are not terminal. Furthermore, there is currently no good alternative to COI studies for monetising the benefits of reductions in substance abuse, a crucial step in the quantitative analyses of different drug policy strategies".*

[86] Clabaugh G and Ward MM (2008). Cost-of-Illness Studies in the United States: A Systematic Review of Methodologies Used for Direct Cost, *Value in Health*, 11(1); 13-21.

Alcohol-Specific Cost-of-Illness Studies

A large number of cost-of-alcohol studies have been undertaken in a variety of countries, often in combination with studies of the societal costs associated with using illicit drugs. These have taken a variety of perspectives, with some studies being more limited than others. For example, a recently-published study of the burden of alcohol-related ill health in the UK (Balakrishnan *et al.* 2009)[87] focused only on "*estimating the health and economic burden of alcohol consumption to the UK National Health Service*". As its author's state:

> *"This paper presents direct costs of ill-health related to alcohol consumption and so underestimates the total cost of alcohol to the UK. Other indirect costs such as sickness absenteeism, production losses due to alcohol-related premature mortality, morbidity or informal care, non-fatal alcohol-related injuries, crime etc., were not included in this estimate. These indirect costs would be substantial……"*

Partly to promote a more consistent and uniform approach for such studies, international guidelines for estimating the costs of substance abuse were developed during the early 2000s. These are discussed in more detail below.

The COI methodology has been employed in a number of alcohol-related studies in recent years, some of which are summarised in Appendix B. These studies have been described as having been undertaken in *"developed societies with middle range levels of alcohol consumption and levels of hazardous drinking"* (Rehm *et al*. 2004[88]), with medium to high expenditure on health and welfare. However, there has recently been increased interest in such studies in middle-income countries (see Table B.4). Several studies (including those in Scotland, England and Sweden) have been undertaken during the 2000s. In addition, those undertaken in the United States, Canada and Australia have had a considerable impact on the cost-of-alcohol methodology. Although, as shown in Tables B.1 and B.2, each study adopts a different approach to the aspects included in its cost estimates, cost-of-alcohol studies generally include costs associated with health care, productivity loss and the criminal justice system.

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87 Balakrishnan R, Allender S, Scarborough P et al. (2009). The burden of alcohol-related ill health in the United Kingdom, *Journal of Public Health* Advanced Access (published June 3, 2009).

88 Rehm J, Room R *et al* (2004). Alcohol use. In Ezzati M, Lopez Ad *et al.* (eds), *Comparative Quantification of Health Risks: Global and Regional Burden of Disease Attributable to Selected Major Risk Factors,* Volume I (pp 959-1108). Geneva: World Health Organisation.

Furthermore, although each of these social cost-of-alcohol studies includes aspects of particular relevance to the country concerned, they also reveal a trend towards methodological homogeneity. However, despite this apparent convergence, full comparability is difficult enough to reach for comparisons within a single society, and even harder across countries. Comparisons of studies in the same country undertaken at different points in time should be undertaken with caution, due to changes in policies, priorities, funding and treatment provision. International comparisons are even more problematic, as the numbers of potential variable factors are much greater.

So do such studies service a useful purpose for policy makers and service providers? As Johansson *et al.* (2006) state:

> *"A minimum argument for the usefulness of cost-of-alcohol studies is that they identify gaps in knowledge about the size of alcohol problems, and how social and other responses to the problems could be valued. These studies could also contribute to knowledge about areas in which policies and preventive action has been deficient or neglected. Beyond this, the studies have been useful in pointing to the 'shape' of alcohol problems in the society – the relative size of costs and investments in different problem areas, different sub-populations, different levels of government, etc., within a given society. … Cost-of-illness studies cannot, of course, offer any indication of the cost-effectiveness of alternative approaches to reducing the costs they identify; for that, cost-effectiveness studies are needed. But a further purpose of cost-of-illness studies is to prepare the ground, in terms of epidemiological and economic indicators which will be needed, for such cost-effectiveness studies".*

An additional consideration in studies of the costs of alcohol misuse is the health-related benefits associated with alcohol consumption, which has a protective effect against some diseases for some sectors of the population. For example, Britton and McPherson (2001)[89] found a reduction in mortality due to alcohol, but noted that this protective effect was only experienced in men aged 55 and over and women aged 65 and over. This observation is supported by the data for Scotland on the protective effects of alcohol consumption in the recent report on alcohol attributable mortality and morbidity (NHS National Services Scotland, 2009b), which show that most (though not all) of the alcohol preventable deaths (in 2003) were experienced by men aged over 55 and females aged over 65.

[89] Britton A and McPherson K (2001). Mortality in England and Wales attributable to current alcohol consumption. *J Epidemiol Community Health* 2001: 55: 383-8

International Guidelines on the Costs of Substance Misuse

The first set of international guidelines for estimating the costs of substance abuse (by a Canadian team led by Eric Single) was published in 2001[90]. The second edition (by Single E, *et al.*[91]) was published by the World Health Organisation in 2003. It states that:

> *"This document presents a general framework for the development of cost estimates. Studies of the economic costs of substance abuse are described as a type of cost-of-illness study in which the impact of substance abuse on the material welfare of a society is estimated by examining the social costs of treatment, prevention, research, law enforcement and lost productivity plus some measure of the quality of life years lost, relative to a counterfactual scenario in which there is no substance abuse."*

According to the 2003 guidelines:

> *"Estimates of the total costs of drug abuse comprise both avoidable and unavoidable costs. Unavoidable costs comprise the costs which are currently borne relating to drug abuse in the past, together with the costs incurred by the proportion of the population whose level of drug consumption will continue to involve costs. Avoidable costs are those costs which are amenable to public policy initiatives and behaviour change."*

Subsequently, the *International Guidelines for the Estimation of the Avoidable Costs of Substance Abuse* were commissioned by Health Canada from the Canadian research team and published in 2006[92]. This document states that:

- *"The current document is meant to provide guidance for developing pilot studies on estimating avoidable costs."*
- *"… it is expected that these guidelines will continually evolve with future applications and studies…."*
- *"… before avoidable costs can be estimated, good basic data on aggregate costs of the substance being studied must already exist."*

However, many of the identified costs of abuse, even if avoidable, may only be reduced or eliminated over long lead times.

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90 Single E, Collins D, Easton B, et al. (2001). *International Guidelines for the Estimating the Costs of Substance Abuse – 2001 Edition*. Canadian Centre for Substance Abuse.

91 Single E, Collins D *et al* (eds) (2003). *International guidelines for estimating the costs of substance abuse*, 2nd edition, Geneva: World Health Organisation.

92 Collins D, Lapsley H, Brochu S, *et al.* (2006). International Guidelines for the Estimation of Avoidable Costs of Substance Abuse. 1st edition. Health Canada.

The second edition (2003) of the International Guidelines focuses on moving towards a common framework for the matrix of costs and issues of measurement. The document also provides detailed discussions many of the underlying methodological aspects associated with studies of the costs of substance misuse (some of which may be less relevant for alcohol misuse, such as those relating to acquisitive crime). The common framework considers costs as follows:

- *Health care and health services:*
  - Treatment for substance abuse;
  - Health treatment for co-morbidity and trauma.
- *Productivity costs:*
  - Premature mortality;
  - Morbidity – lost employment or productivity;
  - Treatment of non-workforce mortality and morbidity.
- *Crime and law enforcement costs:*
  - Criminal justice expenditures;
  - Crime victim's time losses;
  - Incarceration;
  - Crime career costs.
- *Other costs:*
  - Treatment of research, education and law enforcement costs;
  - Prevention and other public health efforts;
  - Property destruction or losses due to crime or accidents;
  - Welfare costs.

These aspects and elements are considered (where relevant/feasible) in this study.

APPENDIX B: COST OF ALCOHOL MISUSE STUDIES

NB: These Tables are included in this Report for information (e.g. to show which elements have been included in/excluded from the studies), but they should not be used to make comparisons between countries and/or over time.

Table B.1a: Annual societal cost of alcohol misuse in Scotland at 2001/02 prices

Resource Use	Annual resource use	Annual cost (£ million)
Health service		
GP consultations	211,516	3.6
GP-prescribed drugs	6% of drugs prescribed by GPs for substance dependency	0.2
Consultations with practice nurses, district nurses and health visitors	No information currently recorded. Unable to quantify.	
Laboratory tests	147,256	1.8
Hospitalisation days	275,775	54.3
Accident and emergency attendances	187,951	9.6
Outpatient visits	93,999	8.1
Day hospital attendances	44,800	3.1
Community psychiatric team visits	8% of total community psychiatric team expenditure	4.0
Ambulance journeys	64,382	9.1
Health promotion/prevention by Health Education Board for Scotland (HEBS), Scottish Executive and Health Boards	HEBS, Drinkwise, Alcohol Development Officers	1.2
Health Board expenditure to alcohol-related voluntary organisations	Funding to 25 organisations	0.6
Sub-total: NHS Scotland		***95.6***
Social work services and associated organisations		
Children and Families	24% of total expenditure on children's and families social work	71.8
Community Care	20% of social work expenditure on the substance misuse client group	2.2
Criminal Justice social work	27% of total expenditure on criminal justice social work	11.1
Children's Hearing System	6% of expenditure	0.8
Voluntary and private sector alcohol services	Expenditure directly on alcohol misuse unavailable	
Sub-total: social work services		***85.9***
Criminal justice system and emergency services		
Custodial services	565,172 days in prison	46.1
Court time and legal costs for prosecutions	42,530 offences proceeded against	19.8
Property damage	Unable to quantify	
Police time	26% of all expenditure	201.8
Fire services time on alcohol-related road traffic accidents	Unable to quantify	
Fire service time on alcohol-related fires	Unable to quantify	
Drink-driving campaign	£141,000 on the binge drinking campaign and £70,000 to be spent on research	0.2
Sub-total: criminal justice system and emergency services		***267.9***

Table B.1a: Cont.

Wider economic costs		
Inability to work (unemployment)	3,536 unemployed individuals	84.0
Working days lost (absenteeism)	1,164,344 days absent from work	119.0
Working days lost by those caring for those with alcohol problems	Unable to quantify	-
Premature mortality in the working population (discounted)	1,641 deaths resulting in 12,546 working years of life lost	201.5
Reduced productivity in the workplace	Unable to quantify	-
Sub-total: wider economic costs		***404.5***
Human costs		
Premature mortality in the non-working population (discounted)	15,457 non-working life years lost	216.7
Morbidity	Unable to quantify the cost of reduced quality of life	-
Sub-total: human costs		***216.7***
TOTAL ANNUAL SOCIETAL COST		**1,070.6**

Source: Scottish Executive, 2001.

Table B.1b: Costs attributable to alcohol misuse in Scotland 2006/07

Resource Category	Cost 2006/07 (£ million)
NHS Cost	
GP/practice consultations	12
GP prescribed drugs	0.77
GP initiated lab tests	0.84
Hospitalisation days (acute)	146
Hospitalisation days (psychiatric)	89
A&E attendances	32
Outpatient appts	64
Community psychiatric service	13
Day hospital	3
Ambulance	32
Health improvement/specific funding	13
Sub-total of NHS cost	*405*
Social Work cost	
Children's Hearings (SCRA)	2
Social work:	
Children's hearings	0.3
Children and families	153
Substance misuse	11
Community care	2
Criminal justice	33
Sub-total of Social Work cost	*169*
Criminal Justice and Emergency Services Cost	
Police time	288
Court and legal costs associated with *prosecutions*	19
Custodial sentences	78
Fire service	6
Sub-total	*385*
"Economic" cost	
Presenteeism	203
Absenteeism	190
Unemployment	96
Premature death	328
Sub-total	*818*
Human cost	
Consequences of crime	145
Homicide	51
Death in fires	23
Excess mortality	248
Sub-total	*466*
TOTAL (rounded)	**2,250**

Source: Scottish Government, 2008a

Table B.2a: Overall costs of alcohol misuse in England in 2001 (£ millions)

	First Estimate	Second Estimate
Health Care Costs		
Hospital inpatient (and day) visits:		
Directly attributable to alcohol misuse	126.2	126.2
Partly attributable to alcohol misuse	344.2	399.8
Hospital outpatient visits	222.8	445.6
Accident and emergency visits	305.2	305.2
Ambulance services	205.0	205.0
Practice nurse consultations	19.1	19.3
NHS GP consultations	27.8	48.7
Laboratory tests	N/A	N/A
Dependency prescribed drugs	1.6	1.6
Other health care costs	35.3	35.3
Specialist treatment services	96.2	96.2
Sub-total for health care costs	*1,383.5*	*1,682.9*
Workplace and Wider Economy Costs		
Lost output due to absenteeism	1,213.6	1,785.9
Lost output due to reduced employment	1,726.1	2,153.7
Lost output due to reduced employment efficiency	N/A	N/A
Lost output due to premature death	2,254.3	2,481.8
Sub-total for workplace and wider economy costs	*5,194.0*	*6,421.4*
Costs of alcohol-related and alcohol-specific crime		
Criminal Justice System costs:		
Alcohol-specific offences	29.9	29.9
Alcohol-related offences	1,720.4	1,720.4
Property/health and victim services	2,521.2	2,521.2
Costs in anticipation of crime (alarms etc)	1,494.6	1,494.6
Lost productive output of victims	969.8	969.8
Emotional impact costs for victims of crime	4,678.6	4,678.6
Drink driving:		
Criminal Justice System costs	77.3	77.3
Cost of drink driving casualties:		
Lost output:		
Serious casualties	33.8	33.8
Slight casualties	25.9	25.9
Medical and ambulance:		
Serious casualties	20.5	20.5
Slight casualties	11.0	11.0
Human costs:		
Serious casualties	232.8	232.8
Slight casualties	123.8	123.8
Sub-total of alcohol-related and alcohol-specific crime	*11,939.6*	*11,939.6*
TOTAL COSTS	**18,517.1**	**20,044.0**

Source: Cabinet Office Strategy Unit, 2003

Table B.2b: Annual cost of alcohol harm to the NHS in England in 2006/07 prices

	Cost estimate (£m)
Hospital inpatient and day visits:	
- Directly attributable to alcohol misuse	167.6
- Partly attributable to alcohol misuse	1,022.7
Hospital outpatient visits	272.4
Accident and emergency visits	645.7
Ambulance services	372.4
NHS GP consultations	102.1
Practice nurse consultations	9.5
Laboratory tests	N/A
Dependency prescribed drugs	2.1
Specialist treatment services	55.3
Other health care costs	54.4
Total	**2,704.1**

Source: Department of Health (2008)

Table B.3: Cost-of-alcohol studies, in millions PPP US$ 2003 (costs per capital in parenthesis)

Study	Healthcare	Productivity loss	Criminal Justice System	Societal Intervention	Intangible costs	Other	Total Societal Cost
Sweden (Johnson, 1983)	3,267 (393)	7,885 (948)	408[d] (49)	1,508[g] (181)		2,827[j] (340)	15,896 (1,911)
Canada (Single *et al.*, 1998)	1,385 (49)	4,406 (155)	1,447 (51)	207[h,i] (7)		567[k,l] (20)	8,011 (282)
Scotland (Scottish Executive, 2001)	158 (31)	1,026[a] (203)	442 (87)	142 (28)			1,767 (349)
United States (NIDA, 2002)	24,665 (97)	140,166[b] (550)	8,269 (32)	895[h] (4)		19,924[m] (78)	193,908 (760)
Australia (Collins and Lapsley, 2002)	192 (10)	1,516 (80)	944 (50)		1,726 (91)		6,464 (343)
England & Wales (Cabinet Office Strategy Unit, 2003)	2,299 – 2,787 (44 – 45)	8,538 – 10,532[c] (164 – 202)	18,675[e,f] (359)		580[c] (11)		30,090 – 32,572 (578 – 626)
Norway (Gjelsvik, 2004)	98 – 177 (22 – 39)	1,298 – 1,405 (288 – 312)	593[f] (132)	42 (9)			2,030 – 2,217 (451 – 492)
Canada (Rehm *et al.*, 2006)	2,710 (90)	5,840 (195)	2,518 (84)	97[h,i] (3)		762[l,o] (25)	11,927 (397)

Source: Johansson P, Jarl J, Eriksson A et al. The Social Costs of Alcohol in Sweden 2002, 2006
(a) includes non-working population; (b) includes crime-related; (c) drinking driving; (d) criminal care and prevention; (e) includes intangible costs; (f) includes crime anticipation; (g) social care and prevention; (h) administrative costs; (i) research and prevention; (j) property damage and alcohol production; (k) drug testing and promotion programmes at work; (l) fire and traffic accidents; (m) motor vehicle crashes & fire; (n) road accidents and resources used in abusive consumption; (o) includes workplace costs.

Table B.4: Overview of economic costs attributable to alcohol in selected high-income and middle-income countries (in 2007 million international $)

	High-income countries					Middle-income countries		
	France	USA	Scotland	Canada	Weighted average	South Korea	Thailand	Weighted average
Study year	1997	1998	2001/02	2002	NA	2000	2006	NA
Population in study year (Million)	58.6	280.6	5.1	31.9	NA	47.5	64.6	NA
GDP (PPP) in study year*	1,301,087	8,587,884	133,179	929,912	6,689,552	760,549	604,575	670,666
Total economic costs of alcohol	22,506	234,854	1,813	13,406	179,859	24,914	7,903	15,111
Cost per head (2007 US$ PPP)	384	837	358	420	725	524	122	293
Health-care cost (% total cost)	16.0	12.7	8.9	22.7	12.8	6.1	4.3	5.6
Law enforce-ment (% total cost)	0.3	3.4	25.0	21.1	3.5	-	0.2	0.1
Other direct cost (% total cost)	33.9	11.2	8.0	7.2	11.6	21.9	0.6	15.5
Indirect cost (% total cost)	49.9	72.7	58.0	49.0	72.1	72.0	94.8	78.9
Total cost (% GDP [PPP])	1.7	2.7	1.4	1.4	2.5	3.3	1.3	2.1

GDP = Gross Domestic Product; NA = not applicable because data unavailable; PPP = Purchasing Power Parity; * Adjusted to 2007 US$ million

Source: Rehm *et al.,* 2009. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders, *The Lancet,* vol 373, 27 June 2009, 2223-33

APPENDIX C: RELATING TO HEALTH CARE

Table C.1: Unit healthcare resource costs at 2007/08 prices

Resource	£ 2007/08	Source
GP and PN consultation	£32.00	ISD Scotland, direct communication.
Cost per non-psychiatric inpatient bed day	£480.56	ISD Scotland *Costs Book 2007/08*. Table R04X: Net cost per case of inpatient stay (All Specialties exc. Long Stay) / average length of stay (All Specialities exc. Long Stay).
Cost per psychiatric inpatient bed day	£315.57	ISD Scotland *Costs Book 2007/08*. Table R040LSX: Net cost per inpatient week for General Psychiatry / 7 days.
Cost per maternity inpatient episode	£1,549	ISD Scotland *Costs Book 2007/08*. Table R040X: Median of net cost per case of inpatient stay for Obstetrics GP and Obstetrics Specialist.
Cost per A&E attendance	£92.54	ISD Scotland *Costs Book 2007/08*. Table R04X: Cost per outpatient case for Accident & Emergency specialty.
Cost per outpatient attendance	£107.58	ISD Scotland *Costs Book 2007/08*. Table R04X: Cost per outpatient attendance.
Annual cost of community psychiatric teams	£143,218,000	ISD Scotland Costs Book 2007/08. Table R500: Net expenditure CPT.
Cost per community psychiatric team visit	£156.92	ISD Scotland Costs Book 2007/08. Table R500: Cost per CPT visit.
Cost per health visitor visit	£44.99	ISD Scotland Costs Book 2007/08. Table R500: Cost per health visitor visit.
Cost per psych day attendance	£139.74	ISD Scotland *Costs Book 2007/08*. Table R048X: Median of net cost per day attendance for General Psychiatry and Geriatric Psychiatry.
Cost per ambulance journey	£232.29	ISD Scotland *Costs Book 2007/08*. Table R910: Cost per incident Accident & Emergency road ambulance.
Haematology test	£5.88	ISD Scotland *Costs Book 2007/08.* Table R130X: Cost per haematology specimen.
Biochemistry test	£0.87	ISD Scotland *Costs Book 2007/08.* Table R130X: Cost per clinical chemistry test.

Table C.2: Number of GP and PN consultations arising from conditions wholly attributable to alcohol misuse (2007/08)*

Read code	Diagnosis
136S.	Hazardous alcohol use
136T.	Harmful alcohol use
63C7.	Maternal alcohol abuse
66e..	Alcohol disorder monitoring
66e0.	Alcohol abuse monitoring
8BA8.	Alcohol detoxification
8CG..	Care programme approach level
8CG0.	Care programme approach level 1
8CG1.	Care programme approach level 2
8CG2.	Care programme approach level 3
8CG3.	Enhanced care programme approach level
8CG4.	Standard care programme approach level
8CG5.	Care programme approach completed
8CG6.	Care Programme Approach review
C1505	Alcohol-induced pseudo-Cushing's syndrome
E01..	Alcoholic psychoses
E010.	Alcohol withdrawal delirium
E011.	Alcohol amnestic syndrome
E0110	Korsakov's alcoholic psychosis
E0111	Korsakov's alcoholic psychosis with peripheral neuritis
E0112	Wernicke-Korsakov syndrome
E011z	Alcohol amnestic syndrome NOS
E012.	Other alcoholic dementia
E0120	Chronic alcoholic brain syndrome
E013.	Alcohol withdrawal hallucinosis
E014.	Pathological alcohol intoxication
E015.	Alcoholic paranoia
E01y.	Other alcoholic psychosis
E01y0	Alcohol withdrawal syndrome
E01yz	Other alcoholic psychosis NOS
E01z.	Alcoholic psychosis NOS
E23..	Alcohol dependence syndrome
E230.	Acute alcoholic intoxication in alcoholism
E2300	Acute alcoholic intoxication, unspecified, in alcoholism
E2301	Continuous acute alcoholic intoxication in alcoholism
E2302	Episodic acute alcoholic intoxication in alcoholism
E2303	Acute alcoholic intoxication in remission, in alcoholism
E230z	Acute alcoholic intoxication in alcoholism NOS
E231.	Chronic alcoholism
E2310	Unspecified chronic alcoholism
E2311	Continuous chronic alcoholism
E2312	Episodic chronic alcoholism
E2313	Chronic alcoholism in remission
E231z	Chronic alcoholism NOS
E23z.	Alcohol dependence syndrome NOS
E250.	Nondependent alcohol abuse
E2500	Nondependent alcohol abuse, unspecified
E2501	Nondependent alcohol abuse, continuous
E2502	Nondependent alcohol abuse, episodic
E2503	Nondependent alcohol abuse in remission

Table C.2 continued

Read code	Diagnosis
E250z	Nondependent alcohol abuse NOS
Eu10.	[X]Mental and behavioural disorders due to use of alcohol
Eu100	[X]Mental & behav dis due to use alcohol: acute intoxication
Eu101	[X]Mental and behav dis due to use of alcohol: harmful use
Eu102	[X]Mental and behav dis due to use alcohol: dependence syndr
Eu103	[X]Mental and behav dis due to use alcohol: withdrawal state
Eu104	[X]Men & behav dis due alcohl: withdrawl state with delirium
Eu105	[X]Mental & behav dis due to use alcohol: psychotic disorder
Eu106	[X]Mental and behav dis due to use alcohol: amnesic syndrome
Eu107	[X]Men & behav dis due alcoh: resid & late-onset psychot dis
Eu108	[X]Alcohol withdrawal-induced seizure
Eu10y	[X]Men & behav dis due to use alcohol: oth men & behav dis
Eu10z	[X]Ment & behav dis due use alcohol: unsp ment & behav dis
F11x0	Cerebral degeneration due to alcoholism
F1440	Cerebellar ataxia due to alcoholism
F3747	Polyneuropathy in pellagra
F375.	Alcoholic polyneuropathy
F3941	Alcoholic myopathy
G555.	Alcoholic cardiomyopathy
G8523	Oesophageal varices in alcoholic cirrhosis of the liver
J153.	Alcoholic gastritis
J610.	Alcoholic fatty liver
J611.	Acute alcoholic hepatitis
J612.	Alcoholic cirrhosis of liver
J6120	Alcoholic fibrosis and sclerosis of liver
J613.	Alcoholic liver damage unspecified
J6130	Alcoholic hepatic failure
J617.	Alcoholic hepatitis
J6170	Chronic alcoholic hepatitis
J6710	Alcohol-induced chronic pancreatitis
SLH3.	Alcohol deterrent poisoning
ZV57A	[V]Alcohol rehabilitation
ZV6D6	[V]Alcohol abuse counselling and surveillance

* Full stops indicate that higher level codes have 'child codes' (i.e. subcategories); codes with more full stops have more sublevels of child codes.

Source: PTI data, ISD Scotland

Table C.3: Number of GP and PN consultations arising from conditions that are partially attributable to alcohol misuse (2007/08)

Diagnosis	Number of consultations 2007/08
Cancer of the lip	4
Cancer of the oral cavity and pharynx	1,002
Oesophageal cancer	1,051
Colorectal cancer	635
Cancer of the liver and intrahepatic bile ducts	72
Laryngeal cancer	257
Breast cancer	1,433
Epilepsy and Status epilepticus	18,038
Hypertensive diseases	262,624
Coronary heart disease*	-24,930
Cardiac arrhythmias	83,366
Haemorrhagic stroke	537
Ischaemic stroke	1,314
Oesophageal varices	271
Mallory-Weiss syndrome	33
Unspecified liver disease	3,109
Portal hypertension	178
Cholelithiasis	-2,227
Acute and other chronic pancreatitis	1,041
Psoriasis	8,582
Spontaneous abortion	748
Road traffic accidents - pedestrian	0
Road traffic accidents - non pedestrian	15
Water transport injuries	0
Fall injuries	1,051
Occupational work/machine injuries	265
Firearm injuries	9
Drowning	0
Inhalation and ingestion of food causing obstruction of respiratory tract	0
Fire injuries	0
Accidental excessive cold	0
Accidental poisoning by and exposure to noxious substances	28
Intentional self-harm\Event of undetermined intent	777
Assault	1,875
TOTAL	**361,158**

* As alcohol has a protective effect for coronary heart disease and cholelithiasis, the alcohol PAF has a negative value and therefore the estimate is of the number of prevented consultations attributable to alcohol consumption (ISD Scotland, 2009).

Source: PTI Data combined with PAFs from ISD Scotland (2009).

Table C.4: ICD10 codes for conditions directly attributable to alcohol misuse

ICD10 Code(s)	Condition
F10	Mental & Behavioural Disorders
K70	Alcohol Liver Disease
X45	Accidental Poisoning
X65	Intentional Poisoning
Y15	Poisoning by Exposure
Y90	Evidence of Alcohol - Blood Level
Y91	Evidence of Alcohol - Level of Intoxication
E244	Alcohol Induced Pseudo-Cushings
E512	Wernickes Encephalopathy
G312	Degeneration of the nervous system due to alcohol
G621	Alcoholic Polyneuropathy
G721	Alcoholic Myopathy
I426	Alcoholic cardiomyopathy
K292	Alcoholic gastritis
K860	Alcohol-induced chronic pancreatitis
O354	Maternal Care
P043	Foetus & Newborn affected
Q860	Fetal Alcohol Syndrome
T510	Toxic Effect of Ethanol
T511	Toxic Effect of Methanol
T519	Toxic Effect of Alcohol NOS
Y573	Alcohol Deterrents
R780	Finding alcohol in blood
Z502	Alcohol Rehabilitation
Z714	Alcohol Abuse Counselling
Z721	Alcohol Use

Table C.5: Number of hospitalisations indirectly attributable to alcohol misuse in 2007/08 (by primary diagnosis only)

Diagnosis	Number of episodes 2007/08	Number of bed days 2007/08
Oropharyngeal cancer (C00, C01-C06, C09-10, C12-14)	908	6,652
Oesophageal cancer (C15)	897	4,840
Colorectal cancer (C18-C20)	456	2,181
Liver cancer (C22)	102	731
Laryngeal cancer (C32)	245	1,576
Breast cancer (C50)	575	2,959
Hypertensive diseases (I10-I15)	352	1,521
Cardiac arrhythmias (I47, I48)	2,721	7,084
Ischemic stroke, (I63-I66)	289	2,180
Haemorrhagic stroke (I60-I62)	481	3,499
Coronary heart disease (I20-I25)	-2,767	-7,938
Oesophageal varices (I85, I98.2)	127	608
Mallory-Weiss syndrome (K22.6)	102	175
Liver disease, unspecified (K73, K74.0-2, K76.0, K76.9)	194	704
Portal hypertension (K76.6)	18	86
Epilepsy and Status epilepticus (G40-G41)	1,773	4,336
Cholelithiasis (K80)	-2,302	-8,087
Acute and other pancreatitis (K85, K86.1)	555	2,931
Spontaneous abortion (O03)	117	81
Psoriasis (L40 excl. L40.5)	214	3,152
Accidental poisoning by and exposure to noxious substances (X40-X49 excl. X45)	0	0
Assault (X85-Y09, Y87.1)	0	0
Drowning (W65-W74)	0	0
Fall injuries (W00-W19)	0	0
Fire injuries (X00-X09)	0	0
Firearm injuries (W32-W34)	0	0
Inhalation and ingestion of food causing obstruction of respiratry tract (W78-W79)	0	0
Intentional self harm/event of undetermined intent (X60-X84, Y10-Y34, Y87.0, Y87.2)	0	0
Occupational work/machine injuries (W24-W31, W45)	0	0
Road traffic accidents - pedestrian (V02-V04 (.1, .9), V06.1, V09.2, V09.3)	0	0
Road traffic accidents - non pedestrian (V12-V14 (.3 -.9), V19.4-V19.6, V19.9, V20-V28 (.3 -.9), V29-V79 (.4 -.9), V80.3-V80.5, V81.1, V82.1, V82.9, V83.0-V86 (.0 -.3), V87.0-V87.9, V89.2, V89.3, V89.9)	0	0
Water transport injuries (V90-V94)	0	0
Accidental excessive cold (X31)	0	0
TOTAL	**5,057**	**29,272**

* As alcohol has a protective effect for coronary heart disease and cholelithiasis, the alcohol PAF has a negative value and therefore the estimate is of the number of prevented hospital episodes attributable to alcohol consumption (ISD Scotland, 2009).

Source: SMR01 data, ISD Scotland combined with PAFs from ISD Scotland (2009).

Table C.6: Number of hospitalisations indirectly attributable to alcohol misuse in 2007/08 (by diagnosis, in any position)

Diagnosis	Number of episodes 2007/08	Number of bed days 2007/08
Oropharyngeal cancer (C00, C01-C06, C09-10, C12-14)	1,084	7,625
Oesophageal cancer (C15)	1,114	5,912
Colorectal cancer (C18-C20)	563	2,767
Liver cancer (C22)	134	926
Laryngeal cancer (C32)	297	2,075
Breast cancer (C50)	769	3,963
Hypertensive diseases (I10-I15)	12,118	52,934
Cardiac arrhythmias (I47, I48)	8,251	37,999
Ischemic stroke, (I63-I66)	333	2,575
Haemorrhagic stroke (I60-I62)	532	3,935
Coronary heart disease (I20-I25)	-7,246	-26,878
Oesophageal varices (I85, I98.2)	315	1,730
Mallory-Weiss syndrome (K22.6)	162	310
Liver disease, unspecified (K73, K74.0-2, K76.0, K76.9)	627	4,323
Portal hypertension (K76.6)	184	1,039
Epilepsy and Status epilepticus (G40-G41)	4,041	13,761
Cholelithiasis (K80)	-2,797	-10,820
Acute and other pancreatitis (K85, K86.1)	680	3,582
Spontaneous abortion (O03)	118	83
Psoriasis (L40 excl. L40.5)	372	3,856
Accidental poisoning by and exposure to noxious substances (X40-X49 excl. X45)	422	647
Assault (X85-Y09, Y87.1)	1,506	2,141
Drowning (W65-W74)	4	6
Fall injuries (W00-W19)	4,671	28,692
Fire injuries (X00-X09)	109	450
Firearm injuries (W32-W34)	17	30
Inhalation and ingestion of food causing obstruction of respiratory tract (W78-W79)	79	262
Intentional self harm/event of undetermined intent (X60-X84, Y10-Y34, Y87.0, Y87.2)	1,113	1,325
Occupational work/machine injuries (W24-W31, W45)	961	1,375
Road traffic accidents - pedestrian (V02-V04 (.1, .9), V06.1, V09.2, V09.3)	184	802
Road traffic accidents - non pedestrian (V12-V14 (.3 -.9), V19.4-V19.6, V19.9, V20-V28 (.3 -.9), V29-V79 (.4 -.9), V80.3-V80.5, V81.1, V82.1, V82.9, V83.0-V86 (.0 -.3), V87.0-V87.9, V89.2, V89.3, V89.9)	318	225
Water transport injuries (V90-V94)	25	64
Accidental excessive cold (X31)	16	75
TOTAL	**31,080**	**147,792**

APPENDIX D: RELATING TO SOCIAL CARE

Table D.1: Findings from studies estimating the level of social work related to alcohol misuse

Report Author	Summary of findings
Aberdeen City Council	A survey undertaken by Aberdeen City Council on alcohol as a reason for social work involvement (1997) found that 24% of children's social work had alcohol cited as a factor in the referral. In 80% of these cases there was a history of alcohol problems of which 93% were by a parent rather than by the child.
Forrester, 2006	In this study all files going for long-term allocation in four London boroughs over an average one year were examined (290 files). Of these, 100 involved concerns about parental substance misuse. It was found that 41 families with 82 children were affected solely by alcohol misuse and 27 families with 39 children were affected by both drug and alcohol misuse.
Hayden, 2004	Information was collected through questionnaires to social workers in an urban area. She found that workers reported substance misuse as causing concern about child welfare in 22% of cases. Three-quarters of the cases (16.5%) involved alcohol misuse and half involved illegal drugs, predominantly opiates.
Cleaver, 1999	Studies found that 20-60% of the cases involved misuse, depending what population of cases was the focus of the study. [Assuming alcohol misuse in three-quarters of cases leads to an estimate of 15-45% of cases].

Additionally, it has been estimated that approximately 65,000 children may be affected by parental alcohol misuse in Scotland (Scottish Government, 2008).

Table D.2: Local Authority Net Revenue Expenditure for 2007-08 on Care Homes for Adults with Addictions / Substance Misuse [1, 2]

	Adults with addictions/substance misuse	TOTAL SOCIAL WORK (£000)
Respite care residential placements [3]	1,149	52,705
Care Homes (non-respite) [4]	4,341	724,127
Other accommodation-based services (non-respite) [5]	1,265	69,938
Accommodation-based services [6]	**6,755**	**973,746**

1 All figures are Net Revenue Expenditure.

2 Adults with addictions / substance misuse – includes all expenditure / costs associated with social work services for all people aged 18 to 64 where the primary reason for care relates to a drug, alcohol, or other substance addiction or misuse.

3 Respite care residential placements - provision and placement costs for adults who have been accommodated temporarily to provide respite for their carers. (This is the residential respite element in the BVACOP "Support for carers" subdivision). It excludes respite placements in another person's home.

4 Care Homes (non-respite) - provision and placement costs for residential care homes for young people; care homes for community care client-groups (formerly registered as residential care or nursing homes). Excludes respite costs.

5 Other accommodation-based services (non-respite) - sheltered housing, care housing, hostels and supported accommodation. Excluding costs applicable to Housing. Excludes respite costs.

6 Total Social Work figure includes amounts used for specific accommodation-based services that are for exclusive use by children. E.g. Residential Schools.

Source: 2007/08 - Local Financial Returns (LFR 3 - Social Work) (Data provided by Statistical Support for Local Government Branch, Scottish Government).

Table D.3: Grounds for referral to the Children's Hearing System (2007/08)

Grounds for referral	Number of children
Beyond control of any relevant person	4,856
Bad associations or moral danger	2,482
Lack of parental care	15,143
Victim of a Schedule 1 offence[1]	19,212
Member of the same household as a victim of a Schedule 1 offence	1,323
Member of the same household as a Schedule 1 offender	515
Member of the same household as an incest victim or perpetrator	20
Not attending school	2,766
Allegedly committed an offence	14,506
Misused alcohol or drugs	1,462
Misused solvents	23
In the care of the local authority, and special measures are necessary	38
Total children referred[2]	50,314

1 Any of the offences mentioned in Schedule 1 of the Criminal Procedure (Scotland) Act 1995 (offences against children to which special provisions apply).

2 A child may be referred to the Reporter more than once in the year on the same and/or different grounds. These totals count every child referred to the Reporter during the year once.

Source: Scottish Children's Reporter Administration (SCRA) Annual Report 2007-2008.

APPENDIX E: RELATING TO CRIME

Table E.1: Length of alcohol specific prison sentences

Length of prison sentence	1 to 30 days	31 to 61 days	62 to 91 days	92 to 122 days	123 to 152 days	153 to 182 days
Mid-point of prison sentence	15.5 days	46 days	76 days	106.5 days	137 days	167 days
Length of sentence served[1]	7.75 days	23 days	38 days	53.25 days	68.5 days	83.5 days
No of persons imprisoned due to drunk driving	12	39	50	60	14	4
Number of 'prison days' resulting from drunk driving offences	93	897	1900	3195	959	334

1 Assuming that persons sentenced to less than four years are automatically released half-way through their sentence

Source: (Scottish Government, 2009e)

Table E.2: Alcohol Attributable Fractions

Scottish crime category	OCJS matched category	Drunk as one reason for crime				Drunk at time of crime			
		Aged 11 – 15		Aged 16+		Aged 11 – 15		Aged 16+	
		Male	Female	Male	Female	Male	Female	Male	Female
Serious assault, other non-sexual crimes of violence	Assault with injury	3.0	6.7	16.3	14.6	6.9	12.0	48.1	31.7
Robbery	Other theft	0.6	2.2	3.6	2.2	2.9	10.8	9.1	3.7
Total sexual offences	All violent offences	1.7	4.8	17.0	13.8	5.5	9.5	42.7	28.9
Housebreaking - domestic dwelling	Other theft	0.6	2.2	3.6	2.2	2.9	10.8	9.1	3.7
Housebreaking - Domestic non-dwelling & other	Other theft	0.6	2.2	3.6	2.2	2.9	10.8	9.1	3.7
Theft from a motor vehicle	Vehicle related thefts	0.0	27.3	6.8	38.5	17.2	27.3	31.8	46.2
Theft of a motor vehicle	Vehicle related thefts	0.0	27.3	6.8	38.5	17.2	27.3	31.8	46.2
Shoplifting	Other theft	0.6	2.2	3.6	2.2	2.9	10.8	9.1	3.7
Other theft	Other theft	0.6	2.2	3.6	2.2	2.9	10.8	9.1	3.7
Fire-raising and vandalism	Criminal damage	3.7	12.1	40.3	30.8	13.0	24.2	58.1	46.2
Minor assault	Assault with injury	0.7	2.8	17.8	12.9	4.4	6.9	36.4	25.7

Source: Purshouse *et al.,* 2009 (Table 2.9).

Table E.3: Published unit costs uplifted to 2007/08 prices

Source	Unit cost crime category	Scottish Government crime category	Cost in anticipation of crime (£)	Costs as a consequence of crime (excluding health costs) (£)	Criminal Justice System costs (£)
Dubourg, 2005	Wounding (serious wounding, other wounding)	Serious assault, other non-sexual crimes of violence	2.22	6351.79	15909.98
Dubourg, 2005	Robbery	Robbery	23.29	4632.69	2884.76
Dubourg, 2005	Sexual offences	Total sexual offences	8.87	30185.16	3657.80
Dubourg, 2005	Burglary in a dwelling	Housebreaking - domestic dwelling	441.42	1920.95	1261.04
Brand, 2000	Burglary not in a dwelling	Housebreaking - Domestic non-dwelling & other	1158.29	1463.10	597.43
Dubourg, 2005	Theft from vehicle	Theft from a motor vehicle	184.11	712.04	55.45
Dubourg, 2005	Theft of vehicle	Theft of a motor vehicle	1015.93	3351.69	220.71
Brand, 2000	Theft from a shop	Shoplifting	36.58	60.96	24.39
Dubourg, 2005	Theft - not vehicle	Other theft	36.60	333.84	333.84
Dubourg, 2005	Criminal damage	Fire-raising and vandalism	54.35	767.49	139.75
Dubourg, 2005	Common assault	Minor assault	0.00	1178.97	282.82

Source: Brand, 2000, Dubourg, 2005 and HM Treasury (http://www.hm-treasury.gov.uk/d/gdp_deflators.xls).

APPENDIX F: RELATING TO COSTS TO THE ECONOMY

Table F.1: Employment-related data for Scotland, 2007 (’000s)

Total population aged 16+:	
All	4,155
Male	1,983
Female	2,172
Total economically active – all aged 16+:	
All	2,677
Male	1,409
Female	1,269
Total in employment – all aged 16+:	
All	2,556
Male	1,345
Female	1,210
Unemployed – all aged 16+:	
All	122
Male	63
Female	59
Economically inactive – all aged 16+:	
All	1,478
Male	574
Female	904
Economic activity rate – age 16-59/64*:	
All	80.9%
Male	84.0%
Female	77.5%
Employment rate – age 16-59/64**:	
All	77.1%
Male	80.2%
Female	73.8%
Unemployment rate (all aged 16+)***:	
All	4.5%
Male	4.5%
Female	4.6%

*: Total working age economically active as a percentage of all persons of working age.
**: Total working age in employment as a percentage of all persons of working age.
***: Total unemployed aged 16 and above as a percentage of all economically active persons aged 16 and above.
Source: Scottish Government (2008h). *2008 Scottish Economic Statistics*

Table F.2a: Median Gross Weekly Earnings (£) of Full-Time Employees by Occupational Group and Gender, Scotland, April 2007

Occupational Group	Male	Female	All
Managers and Senior Officials	715.6	530.2	651.5
Professional Occupations	663.0	607.7	631.3
Associate Professional and Technical Occupations	550.3	471.3	507.2
Administrative and Secretarial Occupations	360.0	324.7	330.6
Skilled Trade Occupations	425.0	275.6	416.1
Personal Service Occupations	362.4	305.2	318.9
Sales and Customer Service Occupations	277.9	258.7	268.8
Process, Plant and Machine Operatives	415.5	282.3	399.1
Elementary Occupations	321.9	240.0	294.0
All Occupations	***£482.20***	***£382.00***	***£441.50***

Source: Scottish Government (2008h). *2008 Scottish Economic Statistics*

Table F.2b: Annualised and *per diem* Gross Earnings, All Occupations, Scotland – uplifted by 4.6% for April 2008

	Male	Female	All
Weekly Earnings	£504.38	£399.57	£461.81
Annualised earnings (i.e. weekly earnings x 365/7)	£26,300	£20,835	£24,080
Earnings per working day (i.e. annualised earnings/228)	£115.35	£91.38	£105.61
Cost to employer per working day (i.e. plus 10% for National Insurance/pension contributions)	£126.89	£100.52	£116.17
Cost to employer per working day (i.e. plus 20% for National Insurance/pension contributions)	£138.42	£109.66	£126.73

Table F.3: Persons in Employment ('000s) by Status, Scotland, 2007

	Male	Female	All
Employees	1,143	1,131	2,274
Self-employed*	185	71	256
Full-time workers	1,194 (89.2%)	736 (60.8%)	1,931 (75.7%)
Part-time workers	145 (10.8%)	475 (39.2%)	620 (24.3%)
All in employment	***1,340***	***1,211***	***2,551***

*: The numbers of employees and self-employed people are less than the total for 'all in employment' due to about 21,000 Unpaid Family Workers and Government Supported Trainees in 2007

Source: Scottish Government (2008h). *2008 Scottish Economic Statistics*

Table F.4a: Alcohol-related* Deaths in People of Working Age (GROS Data), Scotland, 2007

	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	Total
Total alcohol-related deaths (any mention)											
All	1	6	18	49	106	165	245	356	350	357	1,653
Male	1	5	13	37	70	123	160	249	261	264	1,183
Female	0	1	5	12	36	42	85	107	89	93	470
Alcohol-related deaths – underlying cause											
All	0	3	11	36	76	118	166	244	236	203	1,093
Male	0	2	6	28	46	85	109	161	169	148	754
Female	0	1	5	8	30	33	57	83	67	55	339
Alcohol-related deaths – contributory cause of death*											
All	1	3	7	13	30	47	79	112	114	154	560
Male	1	3	7	9	24	38	51	88	92	116	429
Female	0	0	0	4	6	9	28	24	22	38	131

*: The specific ICD10 codes used were F10, G31.2, G62.1, I42.6, K29.2, K70, K73, K74.0, K74.1, K74.2, K74.6, K86.0, X45, X65, and Y15.
**: These data have been calculated by subtracting the data deaths where alcohol was the underlying cause from the total number of alcohol-related deaths
Source: NHS National Services Scotland (2009a). *Alcohol Statistics Scotland 2009* and data directly from GROS.

Table F.4b: Years of Working Life Lost due to Alcohol-related Deaths (any mention) in People of Working Age (GROS Data), Scotland, 2007

	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	Total
Mid point	17	22	27	32	37	42	47	52	57	62	
Working years lost	48	43	38	33	28	23	18	13	8	3	
All	48	258	684	1,617	2,968	3,795	4,410	4,628	2,800	1,071	22,279
Male	48	215	494	1,221	1,960	2,829	2,880	3,237	2,088	792	15,764
Female	0	43	190	396	1,008	966	1,530	1,391	712	279	6,515

Source: calculated from Table F.4a.

Table F.4c: Years of Working Life Lost due to Alcohol-related Deaths (alcohol as underlying cause) in People of Working Age (GROS Data), Scotland, 2007

	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	Total
Mid point	17	22	27	32	37	42	47	52	57	62	
Working years lost	48	43	38	33	28	23	18	13	8	3	
All	0	129	418	1,188	2,128	2,714	2,988	3,172	1,888	609	15,234
Male	0	86	228	924	1,288	1,955	1,962	2,093	1,352	444	10,332
Female	0	43	190	264	840	759	1,026	1,079	536	165	4,902

Source: calculated from Table F.4a.

Table F.4d: Years of working life lost due to alcohol-related deaths (alcohol as contributory cause) in people of working age (GROS Data), Scotland, 2007

	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	Total
Mid point	17	22	27	32	37	42	47	52	57	62	
Working years lost	48	43	38	33	28	23	18	13	8	3	
All	48	129	266	429	840	1,081	1,422	1,456	912	462	7,045
Male	48	129	266	297	672	874	918	1,144	736	348	5,432
Female	0	0	0	132	168	207	504	312	176	114	1,163

Source: calculated from Table F.4a.

Table F.5a: Number of alcohol-attributable deaths in people of working age (ISD Data), Scotland, 2003

	Males		Females		Total	
	No. of alc attrib deaths (%)	No. of all deaths	No. of alc attrib deaths (%)	No. of all deaths	No. of alc attrib deaths (%)	No. of all deaths
16-24	54 (17.5)	308	12 (9.9)	121	66 (15.4)	429
25-44	96 (20.5)	469	29 (16.0)	181	125 (19.2)	650
35-44	233 (26.1)	893	103 (21.1)	489	336 (24.3)	1,382
45-54	390 (23.9)	1,634	203 (19.1)	1,062	593 (22.0)	2,696
55-64	503 (13.3)	3,787	242 (9.9)	2,446	745 (12.0)	6,233
Total 16-64	1,276 (18.0)	7,091	589 (13.7)	4,299	1,865 (16.4)	11,390

Source: NHS National Services Scotland (2009a). *Alcohol attributable mortality and morbidity*

Table F.5b: Years of working life lost due to alcohol-attributable deaths in people of working age (ISD Data), Scotland, 2003

	16-24	25-34	35-44	45-54	55-64	Total
Mid point	20	30	40	50	60	
Working years lost	45	35	25	15	5	
All	2,970	4,375	8,400	8,895	3,725	28,365
Male	2,430	3,360	5,825	5,850	2,515	19,980
Female	540	1,015	2,575	3,045	1,210	8,385

Source: calculated from Table F.5a.

Table F.6a: Estimated deaths in 2003 prevented as a result of alcohol consumption

	16-24	25-34	35-44	45-54	55-64	Total
All	0	2	20	60	172	254
Male	0	2	18	52	144	216
Female	0	0	2	8	28	38

Source: NHS National Services Scotland (2009a). *Alcohol attributable mortality and morbidity*

Table F.6b: Adjusted estimates of alcohol-attributable deaths in people of working age, Scotland, 2003

	16-24	25-34	35-44	45-54	55-64	Total
All	66	123	316	533	573	1,611
Male	54	94	215	338	359	1,060
Female	12	29	101	195	214	551

Source: calculated from Tables F.5a and F.6a

Table F.6c: Adjusted estimates of years of working life lost due to alcohol-attributable deaths in people of working age, Scotland, 2003

	16-24	25-34	35-44	45-54	55-64	Total
Mid point	20	30	40	50	60	
Working years lost	45	35	25	15	5	
All	2,970	4,305	7,900	7,995	2,865	26,035
Male	2,430	3,360	5,825	5,850	2,515	19,980
Female	540	1,015	2,575	3,045	1,210	8,385

Source: calculated from Table F.6b

APPENDIX G: ADDITIONAL MATERIAL ON WIDER COSTS – COSTS OF ACCIDENTS

G.1 Overview

This Appendix, which supports Section 9, provides additional information on the costs associated with three types of accidents that can occur as a consequence of alcohol misuse:

- Fires (both house fires and fires associated with road traffic accidents (RTAs));
- RTAs;
- Homicide.

The analysis includes estimations of the costs associated with premature mortality resulting from such alcohol-related accidents.

G.2 Costs Associated with Alcohol-Related House Fires and Road Traffic Accidents

A link between alcohol consumption and accidents has long been established. A retrospective review of coroners' records (Bedford, 2006) carried out in three counties in Ireland and relating to all cases where a person died as a result of injury or suicide in 2001 and 2002 found that alcohol was detected in about half of the accidental deaths. Key points include:

- Of the 55 individuals who died as a result of road traffic accidents (RTAs), 22 (40%) had blood alcohol contents (BACs) ranging from 16mg/100ml to 325 mg/100ml.
- Persons aged less than 30 years were more likely to have alcohol in their blood.

The costs of accidents in terms of morbidity and use of ambulance service resources have been accounted for within the estimates of alcohol-related NHS costs (Section 5). It has not been possible to determine reasonable estimates of the costs of accidents in terms of Police service time.

a) Costs of Fire Services

Fire Service expenditure in Scotland in 2007/08 is shown in Table G.1.

Table G.1: Fire Service Expenditure (2007/08)

	2007/08 Expenditure (£)
Fire fighting and rescue	244,768,000
Community fire safety	8,129,000
Fire fighters' pensions	55,512,000
Fire service emergency planning and civil protection	1,201,000
TOTAL	**309,610,000**

Source: Scottish Government, LFR03, Annex F
(http://www.scotland.gov.uk/Resource/Doc/933/0080398.xls)

Fire services incur costs due to two types of alcohol-related fires:

- House fires;
- Road Traffic Accidents requiring attendance by one or more fire engines.

Costs of Alcohol-Related House Fires

Fire service resource use relating to the costs of alcohol-related house fires in which there were fatalities is considered below. A study of 535 fatal UK Fire Investigation Reports (Department for Communities and Local Government, 2006) showed for house fires that:

- Alcohol was cited as a cause of the fire in 135 (25%) and as a factor effecting response to a fire in 137 (26%) of cases;
- The victim was impaired by alcohol in 178 fires (33%);
- Alcohol use was often associated with fires at weekends and during the night.

The limited availability of Scottish data means that it has not been possible to estimate the total cost to the fire service of attending a house fire associated with alcohol misuse. However, an estimated 62 people died in 58 house fires in Scotland during 2007/08. Misuse of alcohol was a direct contributory factor in 16 (27.6%) and an indirect factor in 8 (13.8%) of these fires. (Her Majesty's Fire Service Inspectorate for Scotland, 2008). An Office of the Deputy Prime Minister report entitled *The Economic Cost of Fire: Estimates for 2004* (Office of the Deputy Prime Minister, 2006) published estimates for the average cost of a domestic fire. These figures and uplifted values for 2007[93] are shown in Table G.2.

[93] Figures have been uplifted to 2007/08 prices using GDP deflators published by HM Treasury (HM Treasury, 2009).

Table G.2: Estimates for the economic cost of fire

	2004	2007
Human costs	£14,600	£16,175
Property damage	£7,300	£8,087
Response cost	£3,100	£3,434

Source: Office of the Deputy Prime Minister, 2006 – Annex A.

Table G.3 shows an estimate of £664,704 for the 2007 cost of the 24 house fires in which misuse of alcohol was a direct or an indirect factor. This includes a response cost of £82,416. It should be noted that these costs do not appear to include any estimate of the cost of premature mortality.

Table G.3: Estimated cost of house fires in Scotland in which alcohol was a direct or an indirect factor

	2007 (unit cost)	Total cost (based on 24 fires)
Human costs	£16,175	£388,200
Property damage	£8,087	£194,088
Response cost	£3,434	£82,416
TOTAL	**£27,696**	**£664,704**

Costs of Fire Service Response to Alcohol-Related Road Traffic Accidents

Data in the *HMCIFS Annual Report 2007-08* (Her Majesty's Fire Services Inspectorate for Scotland, 2008) indicates that RTAs accounted for 3% of Scottish fire brigade activity (3,510 incidents) in 2007/08. The eight Scottish fire brigades do not collect information on the number of RTAs caused by drink driving that they attend.

Figures for the number of accidents involving drivers/riders with illegal alcohol levels resulting in casualties are not currently available for 2007. However, in 2006 there were a total of 13,109 reported 'injury road accidents'[94] (Scottish Government, 2007) and 720 (5.5%) of these involved drivers/riders with illegal alcohol levels (Scottish Government, 2009g). Assuming that 5.5% of road incidents attended by the Fire Service were alcohol-related and also that the Fire Service expenditure on fire fighting and rescue and on fire fighters' pensions can be split evenly between each incident attended, then the estimated cost is £495,462 (i.e. 5.5% of 3% of £300,280,000). This figure rises to £510,857 if all Fire Service expenditure (as shown in Table G.1) is included in the calculations.

[94] That is, road accidents in which one or more people were injured or killed.

b) Costs of Premature Mortality arising from Alcohol-Related Fires and RTAs

Estimates of the costs associated with premature mortality resulting from alcohol-related house fires and RTAs are also considered.

The cost of premature mortality arising from house fires and RTAs can be estimated using Department for Transport estimates for the average value of preventing a road traffic fatality. These estimates are shown in Table G.4.

Table G.4: Department for Transport Estimates for the Average Value of Preventing a Road Traffic Fatality

	2005	2007
Lost output	£490,960	£519,511
Human cost	£936,380	£990,833
Medical and ambulance cost	£840	£889
	£1,428,180	£1,511,233

Source: Department for Transport, 2007.

In relation to house fires, 24 people died in fires in which alcohol misuse was either a direct or an indirect factor (Her Majesty's Fire Service Inspectorate for Scotland, 2008). Using the Department of Transport costs in Table G.4, the associated premature mortality costs can be estimated at £36,269,592.

Scottish statistics (Scottish Government, 2009g) report that in 2006[95] there were 30 fatalities as a result of accidents involving drivers/riders with illegal alcohol levels. This figure includes fatalities of drivers, passengers and pedestrians in accidents where at least one individual was drunk. If the estimation of the premature mortality cost is based on the total number of such fatalities, there is likely to be a degree of double counting with premature mortality costs calculated elsewhere in this report. However, in the absence of knowing the number of these fatalities who were not themselves under the influence of alcohol at the time of the accident, the associated cost estimate has been calculated based on the total number of fatalities. Using the Department for Transport costs for the average value of preventing a road traffic fatality (as shown in Table G.4), the associated premature mortality costs can be estimated at £45,336,990.

[95] At the time of publication figures for 2007 were not available.

G.3 Homicides and Premature Mortality

The publication *Homicide in Scotland, 2007-08* (Scottish Government, 2008f) indicates that 148 persons were identified and accused of homicide in this year. Additionally, there were 114 deaths recorded by the police as homicide during the year. The drink/drug status of the 148 persons accused in homicide cases is shown in Table G.5.

Table G.5: Drink/drug status of persons accused in homicide cases in 2007/08

	Proportion	Number
Drunk	22%	33
Drunk and on drugs	14%	21
On drugs	9%	13
Not under the influence of drink or drugs	13%	19
Drink/drug status unknown	42%	62
	100%	148

Source: Scottish Government, 2008.

If it is assumed that in all cases where drink/drug status is unknown the accused was not under the influence of drink and if it is also assumed that in all cases where the accused was under the influence of drink the homicide incident involved one victim and one perpetrator, then a cost in terms of premature mortality for homicide victims can be estimated. Information on the age and sex of homicide victims in 2007/08 is included in *Homicide in Scotland, 2007/08* (Scottish Government, 2008f). Using these data, a discount rate of 3.5%, and assuming a life expectancy of 75 years, the cost in terms of premature mortality for homicide victims has been estimated based on the value of a life year being £30,000 or £50,000 (see Section 10 for further discussion of the derivation of these values).

Under these assumptions, the cost in terms of alcohol-related premature mortality for homicide victims can be estimated to be between £25 million and £42 million, as shown in Table G.6.

Table G.6: Costs arising from premature death brought about through homicide

	Victims currently recorded as homicide victims				Cost (£)	
	Male	Female	All	Alcohol related	Value of a life year = £30,000	Value of a life year = £50,000
Under 16	2	4	6	2	1,496,684	2,494,473
16-30	32	6	38	14	9,994,221	16,657,035
31-50	40	9	49	18	10,800,179	18,000,595
Over 50	16	5	21	8	2,764,179	4,606,964
TOTAL COST					**25,055,441**	**41,759,068**

Source: Scottish Government, 2008f.

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