	A. Individual and his / her dependents	£m	B. Employer	£m	C. Government	£m	D. Society as a whole = A + B + C	£m
	Proportion of individual private health insurance premiums attributable to work related ill health / injury	-46	Proportion of corporate private health insurance premiums attributable to work related ill health / injury	-48	Value of treatment and rehabilitation covered by private health insurance claims	73		-21
Administration and legal	Administration of insurance, compensation and benefit claims	-10	Administration of SSP / OSP, insurance and compensation claims	-23	Administration of SSP and benefits claims	-27		-60
	Insurance company profit margin and administration costs on other insurance products	-14						-14
			HSE or LA investigation / prosecution – internal costs and legal costs.	-20	HSE or LA investigation / prosecution – internal costs	-13		-33
			Fines paid	-14	Fines received	14		0
Total costs		-10,052		-3,089		-3,341		-16,482

Note: Money outflows are shown in red as negatives and inflows in black as positives. The net cost to society is the sum of columns A, B and C. Key Abbreviations: OSP – Occupational Sick Pay; SSP - Statutory Sick Pay; NI – National Insurance; EL – Employers' Liability Insurance; HSE – Health and Safety Executive; LA – Local Authority

Non-financial human costs

7.9 The non-financial human costs borne by individuals are also included in the overall cost to society. From Section 4, this is estimated to be £9,301 million but for the reasons described in Section 4 and Appendix 3, this value has a large uncertainty associated with it, which should be acknowledged where practical whenever the value is cited.

Production disturbance

7.10 The production disturbance costs are the additional costs incurred by employers seeking to maintain their output when a regular employee is absent from work. From Section 5, these includes the cost of work reorganisation for short term absences and the recruitment and induction cost of hiring a temporary or permanent replacement worker as cover for long term absences. The total cost to society is estimated to be £141 million.

Health and rehabilitation

7.11 The majority of the health and rehabilitation costs associated with workplace injury and work-related ill health are borne by the government through funding the National Health Service, but there are some additional costs borne by individuals for prescription charges etc. The sum of these two elements represents the total cost to society, estimated to be £802 million.

7.12 From Sections 4, 5 and 6, the total premium paid by individuals and employers for private health insurance attributable to work related incidents is £94 million and the total claim value paid out to fund treatment is £73 million. The £21 million difference between the two is the net cost to society, and represents the profit margin and overheads for the insurance companies.

Administration and legal

7.13 The administrative overhead associated with informing people about sickness absence and processing the various money inflows and outflows from sick pay and benefits payments; compensation and insurance claims; etc, is a net cost to society. Individuals, employers and the government all incur some administrative costs. The total cost to society is estimated to be £74 million.

7.14 Fines paid by employers following successful prosecutions by the authorities are a transfer cost so are not included in the total cost to society. However, the total legal costs and internal manpower costs incurred by employers, the HSE and the local authorities are a resource cost arising from workplace injury so represent a net cost to society. The total is estimated to be £33 million.

Overall costs to society

7.15 The costs from the preceding parts are brought together in Table 19 to give an estimate of the overall costs to society of approximately £16.5 billion in 2006 prices, with a 90% confidence interval of £14.7 billion to £18.3 billion allowing for the sampling uncertainty in the underlying incidence data. Figure 5 shows the corresponding output from the @Risk analysis.

7.16 Of the £16.5 billion, approximately £9.3 billion is for non-financial human costs, £3.4 billion is for financial costs actually incurred in 2006/07 and the remaining £3.8 billion is the present value of future costs.

7.17 The largest cost item is therefore the non-financial human costs, contributing 56% of the total. Given the subjective nature of this cost estimate, and the large uncertainties in its derivation, this needs to be acknowledged. However, these are genuine social costs and they were an important part of previous estimates of both the aggregate costs to society and the appraisal values. Consequently, they must be included here.

7.18 The aggregate costs (financial and non-financial) of the relatively small number of people who never return to work comes to approximately £6.0 billion, which represents 36% of the total.

This is a similar finding to that by Gordon and Risley, and is also potentially of concern since the incidence estimate is based on a single year's LFS data. As more data is collected in future years we would hope that this part of the analysis will become more robust. The influence of the sampling error in the number of people who never return to work combined with their high unit cost is therefore the primary cause of the distribution spread observed in Figure 5.

7.19   An indicative breakdown of how the overall costs to society can be apportioned between industry categories and government office regions can be found in Appendix 4.

Table 19: Aggregate costs to society of workplace fatalities and injuries and work-related ill health in 2006/07, grouped by cost category

	Central estimate £ million	90% confidence interval	
		lower	upper
Loss of output (gross loss of earnings)	5,468	4,466	6,473
Overhead cost of EL insurance	642	n/a	n/a
Non-financial human costs	9,301	8,523	10,082
Production disturbance	141	130	152
Health and rehabilitation	802	771	833
Overhead cost of private health insurance	21	n/a	n/a
Administration	74	70	78
Investigations and prosecutions	33	n/a	n/a
Total costs	16,482	14,717	18,257

Note: Costs are shown in 2006 prices, rounded to the nearest million. There is a 90% chance that the total cost lies between the lower and upper limit due to the LFS sampling error. Rows marked n/a are not affected by LFS sampling error.
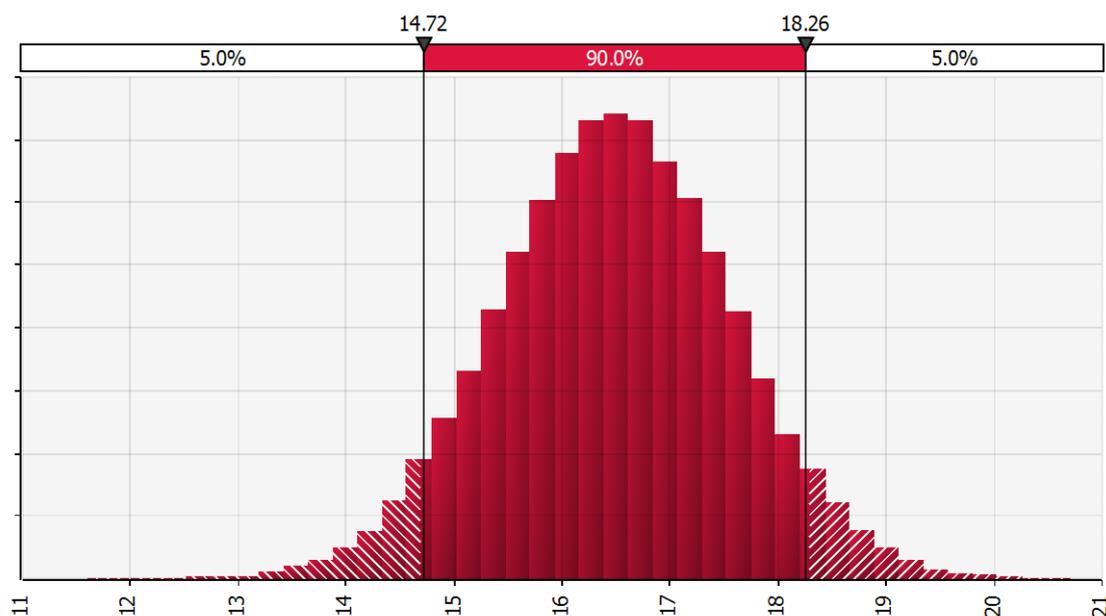

Figure 5: Probability distribution for overall costs to society due to LFS sampling uncertainty, shown in £ billions

8   APPRAISAL VALUES

8.1   The HSE appraisal values are the unit costs to society per incidence of workplace fatality, workplace injury and work-related ill health. They are calculated by dividing the aggregate costs to society in 2006/07 by the number of new incidence cases in 2006/07 for each category of injury and ill health. Strictly speaking therefore they are average costs rather than marginal costs, but as the majority of costs are proportional to the number of new incidence cases this subtlety is not likely to be significant.

8.2   The average appraisal values for all workers are summarised in Table 21, showing financial and subjective non-financial human costs separately.

Table 21: Average appraisal value estimates for 2006/07 for all workers

	Financial costs £	Non-financial human costs £	Total costs £	90% confidence interval	
				lower	upper
Fatality	476,000	976,000	1,452,000	1,445,000	1,463,000
RIDDOR reportable injury (major or over three calendar days) *	6,300	11,400	17,700	16,200	19,300
Non-reportable injury (three or fewer calendar days)	220	20	240	235	245
Ill health *	8,600	9,100	17,700	15,300	20,100

Note: Costs are shown in 2006 prices, rounded to the nearest thousand for fatality and the nearest hundred for injury and ill health. The costs of those who never return to work are included in the items marked with a * on a pro-rata basis.

8.3   The financial costs associated with a fatality are of course much higher than those for non-fatal injuries and ill health because the loss of earnings is cumulative over (typically) twenty years. The total of £1,452,000 for a fatality is slightly lower than the Department for Transport June 2006 figure[54] of £1,489,000 because our estimate of the financial costs is calculated bottom-up for workplace fatalities, rather than relying on the DfT estimates of lost output and medical costs for a road traffic accident[55]. The methodology is broadly consistent with the principles of the original DfT methodology for fatal accidents, as described by O'Reilly[56], see Appendix 5. However there are some aspects of O'Reilly's method that were considered inappropriate for use in the cost model, such as: the allowance for overheads (see paragraph 7.5); any allowance for economic activity rates (unlike traffic fatalities it is known that all workplace casualties economically active at time of injury) and; 1990 discount rates which are superseded by current government appraisal rates of 3.5%.

8.4   The data in Table 21 can be broken down further to estimate the unit costs per incidence for each of the main cost bearing groups. This is shown in Table 22.

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[54] Highways Economics Note No. 1, 2005 Valuation of the Benefits of Prevention of Road Accidents and Casualties, January 2007, Department for Transport

[55] The original DfT research estimated a VPF of £1,000,000 in 1997 prices. The financial costs and human costs have been indexed year on year since then using the average growth in GDP per capita.

[56] O'Reilly, D. M., 1993, Costing road traffic accidents: the value of lost output, TRL Working Paper WP/SRC/09/93

Those who never return to work

9.6   The first year where specific data to estimate the number of never returns has been gathered through the LFS is 2008/09. However, as the 'never return' estimate is based on a small number of sample cases, the LFS is only able to provide a reliable top-level estimate – it is not possible to provide any additional breakdown, for example a reliable split between cases due to injury and cases due to ill health, and an age distribution that could be used to better estimate the present value of future years lost income. HSE should consider whether a more comprehensive survey of 'never returns' is justified. At the very least, data from future LFS returns should be pooled in order to build up a bigger sample size that may allow more robust population estimates to be determined.

Medical treatment costs

9.7   The estimate of medical treatment costs has been done in more detail than was possible in previous reports, but is still an area that would benefit from further research. The unit costs for medical treatments were based on average figures published by the Personal Social Services Research Unit (PSSRU)[58] but the number of visits to the GP, out-patient clinic, physiotherapy, counselling etc required for each condition still had to be estimated using expert opinion as this is not captured in the Labour Force Survey. This is particularly an issue for those who never return to work and has strong links with 'derivation of non-financial costs' above.

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[58] The PSSRU is a collaboration between the University of Kent at Canterbury; the London School of Economics and Political Science; and the University of Manchester. Their publications are available on-line at: http://www.pssru.ac.uk/

APPENDIX 1: SOURCES OF REPLACEMENT INCOME

For most people, absence from work means a reduction in income. However the extent of the reduction is complex, and differs substantially between individuals, depending on the types of replacement income that are available to them to offset their loss of salary.

The cost model constructs a 'bottom' up estimate of the aggregate replacement income using data available in the public domain. The steps involved are as follows:

- Identify the different sources of replacement income.

- Determine what proportion of the fatality and self report cases are able to claim against each type of replacement income, taking into account eligibility criteria, estimated take-up rates, and the fact that some sources of replacement income offer tiered payment rates (e.g. one rate for the first six months and a different rate for the next six months).

- Determine whether the replacement income is paid on the basis of duration of absence in calendar days or in terms of actual lost working time.

- For replacement income paid in the current year, multiply the time away from work (either calendar days or full day equivalent days, depending on the replacement income source) by the appropriate daily rate and the proportion of the population who are assumed to claim it.

- For replacement income paid in future years (such as long term state benefits), multiply the number of years claimed by the appropriate yearly rate and the proportion of the population who are assumed to claim it, and discount to the present day using the HM Treasury discount rate[59]. At present, we can only reliably estimate future year replacement income streams for fatalities and those who never return to work; it is assumed that all other workers are able to return to their normal jobs at their pre-injury / ill health salary level.

Table A1.1 below summarises the sources of replacement income that have been modelled and the payment rates assumed.

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[59] The average age of those who never return to work is used to determine how many years worth of long term benefits are paid (between the date of the incident and the normal retirement date). Benefits are assumed to grow in line with inflation so the future costs are discounted at the current HM Treasury real discount rate of 3.50%.

Table A1.1: Sources of replacement income

Source of replacement income	Assumptions in cost model
Occupational sick pay (OSP)	91% of employers provide OSP to their employees according to the Chartered Institute of Personnel Development 2007 survey (CIPD 2007)[60]. However, the self-employed don't get any OSP so the proportion of all cases of injury and ill-health (employees + self-employed) that are compensated with OSP needs to be reduced accordingly. The effective proportion of self reported cases receiving OSP assumed in the cost model is 79%.
	Almost 90% of employers who provide OSP pay it at the full rate of salary for an average of 15 weeks, which falls part way through the 3 to 6 months off work category in the LFS. Part salary is then paid for an average of an additional 16.4 weeks. The calculation in the cost model therefore apportions the number of days paid at the higher rate and lower rate pro-rata, and corrects for the fact that OSP is paid on an FDE basis rather than a calendar day basis. Salary figures are reduced from 100% and 50% to 90% and 45% respectively to take account of bonuses and overtime that are not included in OSP.
Statutory sick pay only (SSP)	According to CIPD 2007, the remaining 9% of employers offer SSP only to their employees. As above, this needs to be factored pro-rata to take account of the self-employed who don't qualify for SSP. The effective assumed proportion of self reported cases receiving SSP only is 8%.
	SSP is paid from the fourth day of absence for a total of 28 weeks at a rate of £70.05 per week[61] if average gross earnings are £84 per week or more.
Incapacity benefit (IB)	The take-up of income related benefits amongst those who are entitled to them is estimated to be around 90%[62].
	IB is payable at the short term lower rate (£59.20 per week[63] in 2006/07) to those who are unable to work due to ill health for the first 28 weeks, if they are not otherwise receiving OSP or SSP. In the cost model, this applies to those self reported cases which are associated with the self employed (13%).
	The short term higher rate of £70.05 is then payable for

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[60] Absence Management: Annual survey report 2007, CIPD, available on-line at: http://www.cipd.co.uk/)

[61] Rates of Statutory Sick Pay for 2006 taken from HMRC leaflet E14(2006). Available on-line at: http://www.hmrc.gov.uk/helpsheets/2006/e14.pdf

[62] Income Related Benefits Estimates of Take-Up in 2007-08 by expenditure, which contains a comparison against 2006-07 figures, published by DWP and available on-line at: http://www.parliament.uk/deposits/depositedpapers/2009/DEP2009-2874.pdf

[63] DWP leaflet BRA5DWP, 'Social Security Benefit Rates', April 2006

Source of replacement income	Assumptions in cost model
	weeks 29 to 52. The cost model assumes that those eligible include (i) the self employed who were previously claiming the short term lower rate and (ii) employees who previously received SSP only, which came to an end after 28 weeks.
	The long term basic rate of £78.50 is payable for those not able to work due to incapacity for more than 1 year; this then is the primary source of long term replacement income for the 'never return' population.
	Incapacity benefit and income support were replaced by employment and support allowance for new claimants after 27 October 2008, but existing claimants continue to be paid under the old scheme so this is what has been assumed in the cost model. At the time of writing the new coalition government is developing its proposals for future reform to the benefits system, so it is likely that the cost model will need to be updated to reflect any changes when this analysis is next repeated.
Industrial injuries disablement benefit (IIDB)	IIDB is payable to people made ill or disabled because of an accident or event that happened at work. The self employed are not eligible, and the rate of payment depends on age and the seriousness of the disability on a percentage scale, assessed by a doctor.
	In 2006/07 there were 20,980 new claims made with 48% successful for cases of injury, and 20,080 new claims made with 23% successful for prescribed diseases[64]. The cost model assumes that all claimants have an average of 50% disablement, so the benefit payable for those aged over 18 is £63.55 per week.
Other income related benefits[65]	The spouse of a worker who dies as a result of an industrial accident or disease is entitled to a tax free lump sum of £2,000 plus either (i) a bereavement allowance of £85.25 per week for the first 52 weeks, or (ii) widowed parent allowance of £85.25 per week, paid until any dependent child reaches 19. Not all workers will be married, or have children, and the ages of any children is unknown. In the cost model we assume that every fatality triggers a payment of the £2,000 lump sum plus £85.25 in benefits for 52 weeks.
	The benefits claimable by a person on long term sickness absence are complex, for example as well as IB they might include disability living allowance (ranging from £16.50 to £62.25 per week), attendance allowance (ranging from £41.65 to £62.25 per week), income support, housing benefit, council tax benefit, etc. We

[64] Industrial Injuries Disablement Benefit Quarterly Statistics, March 2007, available on-line at::
http://research.dwp.gov.uk/asd/iidb.asp

[65] Information on other income related benefits taken from DWP leaflet BRA5DWP 'Social Security Benefit Rates', April 2006

Source of replacement income	Assumptions in cost model
	have made an estimate of an additional £90 per week in total, based on the lower rate of attendance allowance plus £50 of HB/CTB, only payable to those on long term IB, assuming that means testing prevent such benefits being paid for shorter term absences.
Mortgage protection, income protection and life insurance	Some families choose to insure against loss of income through mortgage protection or income protection insurance policies, and some have life insurance cover. The former is likely to be particularly important for the self employed, who don't have the safety net of sick pay.

Around 40% of households have life insurance; 20% have mortgage protection insurance; and around 2% have income protection insurance[66]. A typical mortgage protection policy pays out after 1 month's absence from work, for up to 1 year. However, at the aggregate level the premiums paid by individuals are offset against the claims received, so the net lost income effect is just the overhead cost associated with the insurance companies' administration and profit margin for the proportion of all claims that relate to workplace incidents. This is estimated to be approximately £14 million in 2006/07. |

[66] ABI UK Insurance key facts for 2006, available on-line at: http://www.abi.org.uk/

APPENDIX 2: MEDICAL COSTS

The Labour Force Survey contains no information on the medical treatment received by those who have reported work related absence, so the medical costs borne either by the individual or the taxpayer have to be estimated.

Gordon and Risley treated all cases of injury and ill health equally and assumed that their medical costs increase in proportion to the duration of absence. We have taken a slightly different approach by separating out the different medical conditions captured in the LFS sample and using published data combined with expert judgement to estimate the whole life treatment costs for each.

Medical costs borne by the NHS

The unit costs of services delivered by the NHS (GP consultations, Accident and Emergency investigations, in-patient and out-patient treatment episodes etc) have been taken from 'Unit Costs of Health and Social Care, 2007', which is an annual publication prepared by the Personal Social Services Research Unit (PSSRU)[67]. The number of visits to the GP, out-patient clinic, physiotherapy, counselling etc required for each condition was estimated by a small group of occupational health experts at a workshop held at Warwick University on 25 May 2010.

Table A2.1 below summarises the medical costs borne by the NHS that have been modelled and the assumptions used.

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[67] The PSSRU is a collaboration between the University of Kent at Canterbury; the London School of Economics and Political Science; and the University of Manchester. Their publications are available on-line at: http://www.pssru.ac.uk/

Table A2.1: Medical costs borne by the NHS

Medical condition	Assumptions in cost model
Reportable major injuries	Reportable major injuries include limb fractures, amputations, dislocations of the shoulder/hip/knee/spine, temporary or permanent eye injuries, and the catch-all category of 'other major injuries' that include injuries leading to hypothermia, heat induced ill health or unconsciousness or requiring resuscitation or admittance to hospital for more than 24 hours. All reportable major injuries are assumed to require the attendance of an ambulance (£257) plus a standard assessment at A&E (£84). If the time off work is greater than seven days, they are also assumed to require an in-patient stay. The average cost of an in-patient non-elective consultant led treatment episode is £1,502. The injured person is assumed to visit their GP once, for example to obtain a sick note. The NHS cost of this visit is £34 for the GP consultation and £44 for a GP dispensed prescription. In addition, the injured person is assumed to attend between two and five out-patient sessions, for example fracture clinics or physiotherapy sessions. The average cost of all adult follow-up attendances is £85, plus £44 for an additional prescription. All of these costs are assumed to occur within 12 months of the date of the injury, so are not discounted.
Reportable over 3 day injuries	Reportable over 3 day injuries include all injuries that result in more than 3 days absence from work and that are not classified as major. It is assumed that an ambulance transfer is not required, and that the initial medical assessment can be done in a non-24 hour A&E department or a minor injuries unit (£35). If the time off work is greater than seven days, they are also assumed to require non-elective consultant led treatment as a day patient (£751). The injured person is assumed to visit their GP once to obtain a sick note, and attend one follow-up out-patient clinic (costs as above). All of these costs are assumed to occur within 12 months of the date of the injury, so are not discounted.
Reportable injury 'never returns'	The NHS costs within the first 12 months are assumed to be as for reportable major injuries above. However, it is then assumed that the injured person will require repeat visits to the GP and out-patient clinic at the same frequency per year for a further ten years. The future costs are adjusted for the estimated real growth in health costs above inflation using the difference between the average growth in the Hospital & Community Health Services (HCHS) Pay and Prices Index and the average growth in the retail prices index (RPI), then discounted to 2006 using the Treasury discount rate of 3.5%.

Medical condition	Assumptions in cost model
Minor injuries less than 3 days away from work	A minor injury is assumed to require initial examination at a minor injuries unit (£35) plus one outpatient visit and prescription charge (£129). No sick note is required so no GP visit is necessary.
Fatalities	The total cost to the NHS of a workplace fatality is estimated to be £402, made up of ambulance attendance (£257), emergency A&E intervention (£111), and death certification by a doctor (£34).
Ill health	It is assumed that the vast majority of cases of ill health captured by the Labour Force Survey would be managed by the patients local GP.
	Treatment episodes for musculoskeletal disorders and stress, depression and anxiety are estimated to last for up to two years following diagnosis, with an average of two visits to the GP per patient per year each involving a standard consultation and a GP dispensed prescription (unit costs as above). Newly diagnosed chronic breathing and lung problems are assumed to involve an overnight stay in hospital if the time off work is greater than seven days; the GP led treatment following this is then estimated to last for ten years. Future year costs of these three conditions are adjusted for real growth above inflation using the Hospital and Community Health Services (HCHS) Pay and Prices Index and are then discounted to 2006, as described above.
	Other cases of ill health captured by the Labour Force Survey are treated similarly to musculoskeletal disorders and stress, although it is assumed that the treatment episode only lasts for one year.
	As noted elsewhere, this analysis largely excludes the costs of chronic industrial diseases with long latency such as cancer. If these conditions were to be included in future revisions to the analysis, their medical cost implications would be considerable (for example the average cost of treating mesothelioma[68] has been estimated as £9,400 per case in 2006 prices and the average cost of treating all cancers[69] has been estimated as £14,600 per case in 2006 prices).
Ill health 'never returns'	The NHS costs within the first 12 months are assumed to be the same as for musculoskeletal disorders and stress (see above). As for injury 'never returns', it is then assumed that the sick person will require repeat visits to the GP at the same frequency per year for a further ten years. The future costs are adjusted for the estimated real growth in health costs above inflation and discounted to 2006.

[68] The Economic Costs of Health Service Treatments for Asbestos-Related Mesothelioma Deaths, Watson et al, 2006, Annals of the New York Academy of Sciences

[69] The governments Cancer reform strategy 2007 (available on-line at: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_081007.pdf) puts the total NHS cost of treating cancer at £4.35 billion per year in 2005 prices in England, with 309,000 new cases of cancer in 2006, giving an estimated unit cost of £14,600 in 2006 prices (inflated using Hospital & Community Health Services (HCHS) Pay and Prices Index)

Medical costs borne by the individual or their family

There are some out of pocket health related costs that the individual will have to fund personally. The costs included in the model and the assumptions made are summarised in Table A2.2.

Table A2.2: Medical costs borne by the individual or their family

Medical condition	Assumptions in cost model
Prescription charges	For every prescription dispensed (see Table A2.1), as well as the NHS cost of £44, the patient makes their own contribution through the standard tariff prescription charge. Note that we have assumed all patients have to pay this charge, which may be an over-estimate. The cost in 2006[70] was £6.65 per item.
Travel costs	Every visit to the GP or out-patient clinic will involve some additional travel expenses for the patient. These are estimated at £10 per round trip.
Home modifications	Permanently incapacitating injuries may require modifications to be made to the person's home. These costs are often partially or wholly met by the local authority, although the eligibility criteria for grants and loans are complex. The PSSRU report (see Footnote 65) discusses a range of costs, from installation of a grab rail at £6 per year (annualised cost) to installation of a stair lift at £373 per year (annualised cost). We have assumed a nominal sum of £100 per year for cases of 'other reportable major injury' and 'reportable injury never returns' as these include the possibility of serious multiple injuries, but zero otherwise.
Funeral expenses	The out-of-pocket cost of a workplace fatality for the victim's family consists primarily of the funeral cost. This is a present value cost rather than a current year cost because it represents the cost of bringing forward the funeral by approximately 30 years. The guide price of a funeral is estimated at £2,750 by the Office of Fair trading.[71] The appropriate present value factor is 0.65, giving a present value cost of £1,787.

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[70] NHS leaflet HC12: Charges and optical voucher values 1 April 2006, available on-line at: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4131675

[71] Office of Fair Trading guidance available on-line at: http://www.oft.gov.uk/oft_and_cd/

APPENDIX 3: NON-FINANCIAL HUMAN COSTS

In their 1999 revision of the Davies and Teasdale[72] attempt to cost workplace-related accidents and ill health, Gordon and Risley (G&R)[73] set out the ways in which they arrived at monetary values of the costs incurred by victims and their families, including the non-financial costs (which they refer to as 'human' or 'subjective' costs).

The essence of what they did is explained in Paragraphs 86-99 inclusive of Chapter 3 of G&R, and in Paragraphs 11-16 inclusive of Appendix 4 of that report.

The purpose of what follows is to discuss some of the difficulties they encountered and try to produce an updated approach which is transparent, consistent and makes the best use of the data available currently. In the course of doing so, the aim is to clarify issues which have sometimes caused confusion, and to identify those aspects of the available data that are less informative than might be desired. Limitations in existing databases necessarily result in some uncertainties about the estimates we can make, and this appendix will indicate ways in which those data, and hence the estimates of the non-financial costs, might in future be enhanced.

The general approach, which underpinned G&R and which constitutes the basis for the present estimates of the non-financial costs, involves using the stated preferences of representative samples of members of the public. These preferences are elicited in the form of their expressed willingness to pay (WTP) for reductions in the risks of premature death, injury and ill health and also the trade-offs they say they are willing to make between different levels of these hazards. The lynchpin in what G&R did and in what follows is the value of preventing a fatality (VPF).

The Value of Preventing a Fatality (VPF)

The Department for Transport has for more than twenty years used a WTP-based figure to value the benefit of measures designed to prevent one statistical fatality[74]. As presented by DfT in Section 2.1.5 of its webTAG unit 3.4.1[75], and previously in their publication Highways Economics Note 1[76], this total figure is composed of three elements: lost output, human costs, and medical and ambulance costs. The figures for June 2006 are shown below, calculated from the published June 2005 values and the appropriate uplift factor of 1.0427.

£	Lost output	Human costs	Medical and ambulance costs	Total
June 2005	490,960	936,380	840	1,428,180
June 2006	511,924	976,363	876	1,489,163

However, this way of decomposing the total does not exactly correspond with the conceptual and empirical basis for the figure. Setting the medical and ambulance costs aside – there is no issue about them – the preference-based approach entails separating the component which reflects people's WTP to reduce their own risks of premature death from the component which reflects the loss to the rest of society of the surplus that the (typical) victim would have

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[72] Davies, NV and Teasdale, P, 1994. The costs to the British economy of work accidents and work related ill health. HSE Books ISBN 0 717 0666 X

[73] Gordon, F, Risley, D, and EAU economists, 1999.   The costs to Britain of workplace accidents and work related ill health in 1995/96. Second Edition. HSE Books ISBN 0 7176 1709 2

[74] To be more precise, it is the value of safety improvements intended to reduce the risks of a large number of road users to the extent that, on average, they will prevent one fatality that could have been expected to occur in the absence of those safety improvements.

[75] webTag unit 3.4.1, The Accidents Sub-Objective, available on line at: www.dft.gov.uk/webtag

[76] Highways Economics Note No. 1, 2005 Valuation of the Benefits of Prevention of Road Accidents and Casualties, January 2007, Department for Transport

APPENDIX 4: REGIONAL AND SECTORAL BREAKDOWN

Methodology

A breakdown of the aggregate costs to society of workplace fatalities and self reports by both region and industry sector can be estimated by multiplying the estimated regional and industry incidence of work-related ill health and workplace injury by the relevant unit cost per case.

For regional estimates, the unit cost per case is assumed to be the same across regions and equal to the national appraisal value (see Table 21). This approach does not allow for regional wage variations, which might be significant for Greater London where the average wage is markedly greater than in the rest of Great Britain. However, regional wage variations are affected by the industry composition of employment within a region (for example, a larger percentage of professional jobs in Greater London). Since the industry composition of employment within a region does not necessarily mirror the industry composition of workplace fatalities and self reports within a region, an adjustment for regional salary variations was judged as potentially having an unknown distorting effect on the cost estimates. It was therefore felt more prudent to use the appraisal values which are based on the national average salary.

For cost estimates by industry, allowance for variation in wage rate by industry has been made to the unit cost per case, and industry specific unit cost values estimated. An analysis of the Annual Survey of Hours and Earnings data for 2006 suggests that the industry group 'Agriculture, hunting, forestry and fishing' have salary levels significantly less than the mean of all workers. The average gross wage per full-day equivalent (FDE) day for workers in this industry group is around a quarter less than the national average (£73 compared to £102), whilst the other industry groups have salary levels similar to the all industry average. In the cost model, industry specific unit cost estimates have been calculated by factoring the loss of earnings component of the national appraisal values by the ratio of industry wage to average wage (the loss of earnings component accounts for around 25% of the national appraisal values for injuries, and around 40% for ill health). All other components of the national appraisal value are assumed to be the same across industry.

Industry specific aggregate costs have been estimated for four broad industry groupings, classified using the 1992 Standard Industrial Classification:

A, B	agriculture, hunting, forestry and fishing
C, D and E	mining, quarrying, manufacturing and utilities supply
F	construction
G to O	services, public administration, education health and social work.

Regional employment and incidence profile

Employment numbers vary significantly by region. In 2006, over a quarter of jobs in Great Britain were in London and the South East, whilst Wales and the North East each accounted for less than 5% of all jobs in Great Britain[82] (see Figure A4.1). Figure A4.2 shows the regional breakdown of fatal injuries and new incidence cases of self-reported non-fatal injuries and work-related ill health to workers. Not surprisingly, this breakdown bears some resemblance to the regional employment profile, with Wales and the North East accounting for the fewest incidence cases. However, it should be noted that other factors as well as employment levels will determine the actual number of work related ill health and injury cases within a region, for example the industrial and occupational mix of employment.

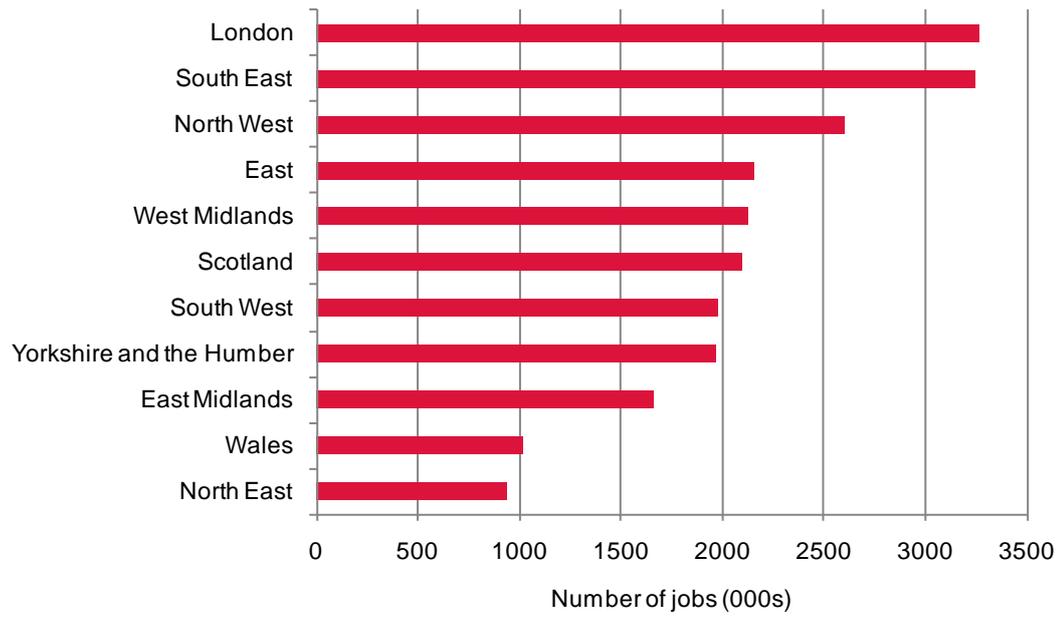[82] Source: Annual Survey of Hours and Earnings, 2006

Figure A4.1: Jobs by region in 2006

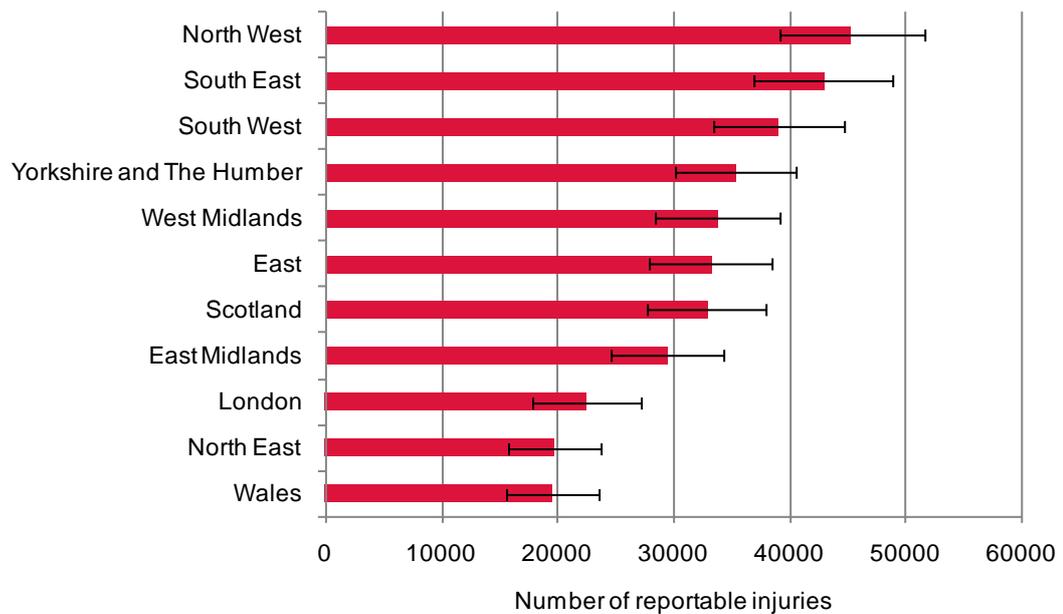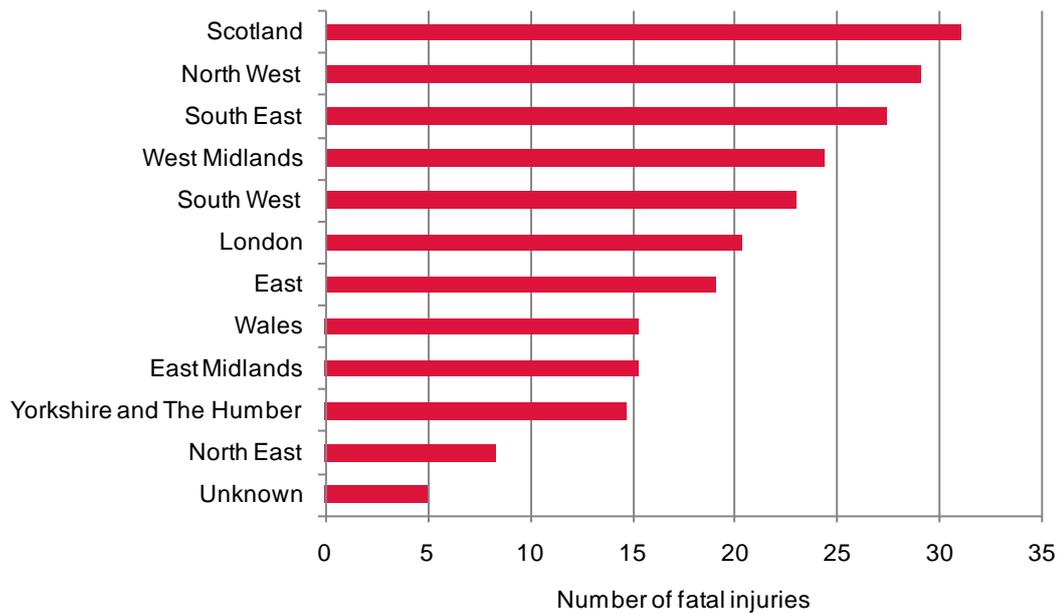Source: Annual Survey of Hours and Earnings, 2006

Figure A4.2a: Incidence of fatal injuries and new incidence cases of self-reported non-fatal reportable injuries for workers by region in 2006

Note: The red bar shows the mean value and the black whiskers show the 90% confidence interval. The figures for fatal injuries are average annual numbers reported to all enforcing authorities for 2005/06 to 2007/08. The figures for non-fatal injuries are annual average numbers estimated from the Labour Force Survey for 2006/07 and 2007/08.
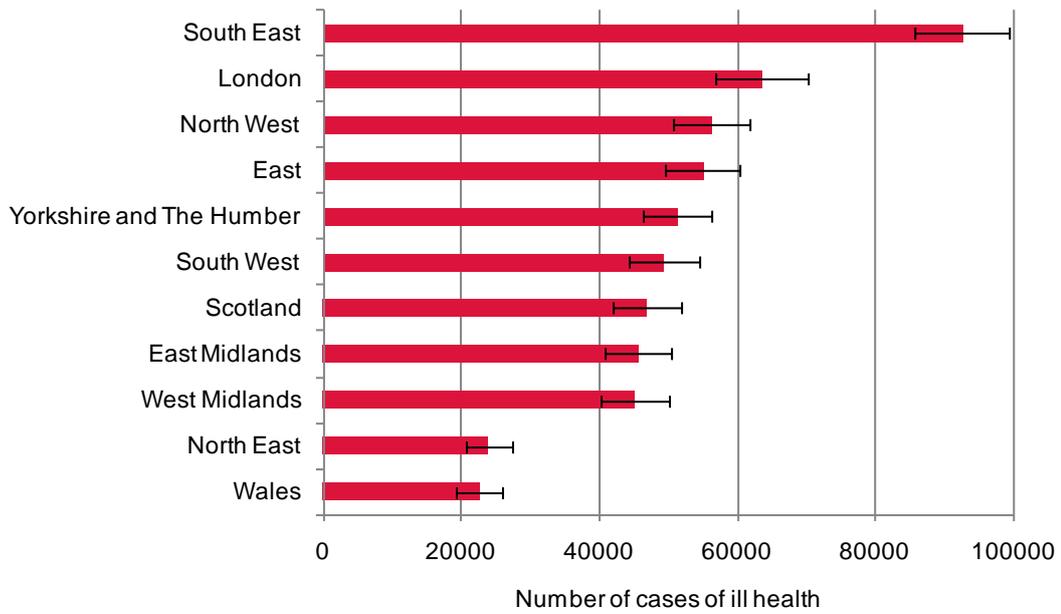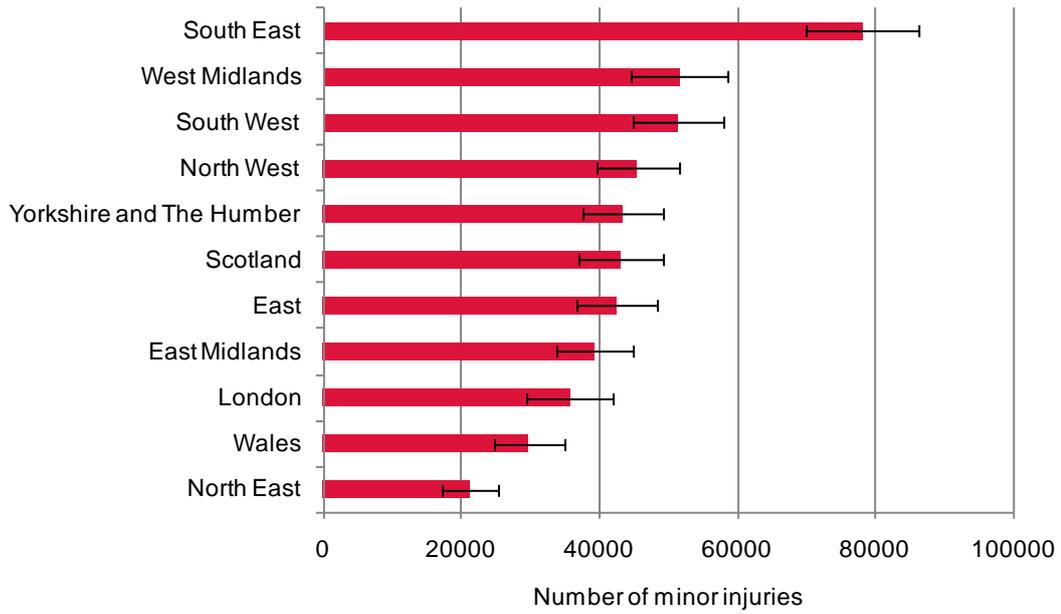
Figure A4.2b: New incidence cases of self-reported minor injuries and work-related ill health for workers by region in 2006

Note: The red bar shows the mean value and the black whiskers show the 90% confidence interval. The figures for minor injuries are annual average numbers estimated from the Labour Force Survey for 2006/07 and 2007/08. The figures for ill health are annual average numbers estimated from the Labour Force Survey for 2005/06 to 2007/08.

Regional costs to society

As with the national picture, the regional costs to society are dominated by self-reported ill health and reportable injury. (Whilst the unit cost of a fatality is high, the annual number of fatalities is comparatively low and conversely whilst the annual number of non-reportable injuries is high, the unit cost of a non-reportable injury is low).

The aggregate costs to society of fatalities and self reports by region in 2006 are presented in Table A4.1. Figure A4.3 shows the total cost values with confidence intervals calculated from the @Risk analysis. The South East bears the highest cost (an estimated £2.5bn, largely reflecting the number of workers in this region), whilst Wales bears the lowest cost (an estimated £0.8bn, and again largely reflecting the employment total of the region).

Table A4.1: Aggregate costs to society of workplace fatalities, workplace injury and work-related ill health in 2006/07, broken down by government office region

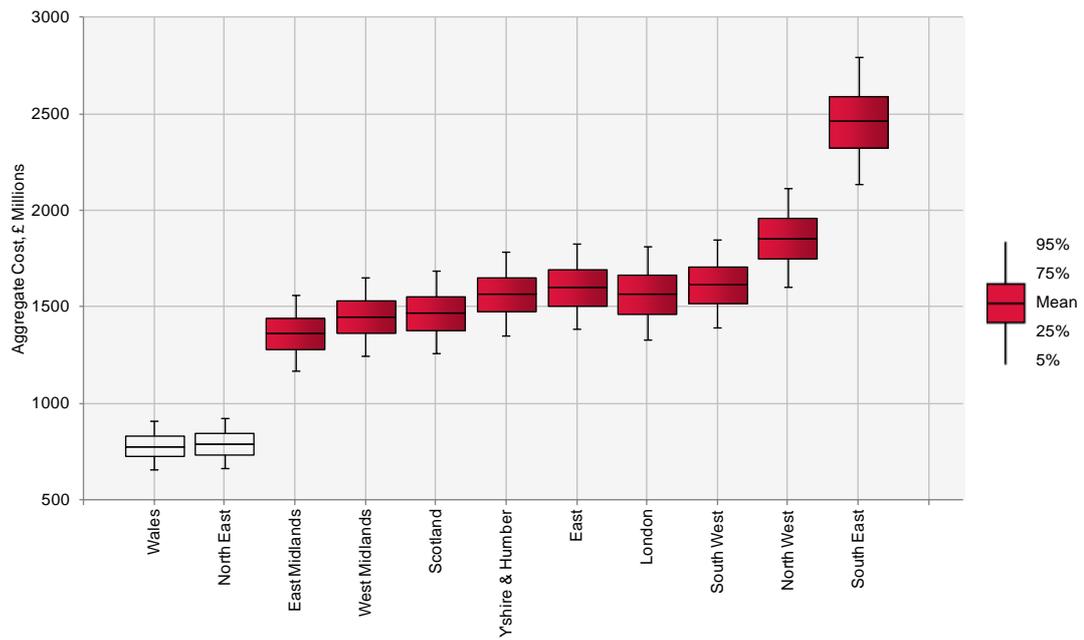| £ millions	Workplace fatalities	Reportable injuries (major or over 3 days)	Minor injuries (under 3 days)	Ill health	Total cost
South East	40	760	19	1,638	2,457
North West	42	802	11	996	1,852
South West	33	692	13	873	1,611
London	30	399	9	1,124	1,561
East	28	588	10	972	1,598
Yorkshire and The Humber	21	625	11	905	1,562
Scotland	45	582	10	828	1,466
West Midlands	35	599	13	797	1,444
East Midlands	22	521	10	807	1,360
North East	12	349	5	423	789
Wales	22	347	7	400	777
Total (inc. unknown)	337	6,263	118	9,764	16,482

Note: Costs are shown in 2006 prices

Figure A4.3: Aggregate costs to society (in £millions) of workplace fatalities, workplace injury and work-related ill health in 2006/07, broken down by government office region

Note: 50% confidence intervals are shown by the red box and 90% confidence intervals are shown by the black whiskers

Industry employment and incidence profile

The Services grouping accounts for the majority of UK employment (see Figure A4.4), and the incidence profile of self-reported work-related ill health and non-fatal workplace injury by industry largely reflects this (see Figure A4.5). In contrast, the breakdown of fatal injuries by industry is quite different from the overall employment profile – almost half of all workplace fatal injuries occurred to workers in the construction and agricultural groupings, despite these accounting for only around 5% of total employment. This reflects the higher risks posed in these two industry sectors.
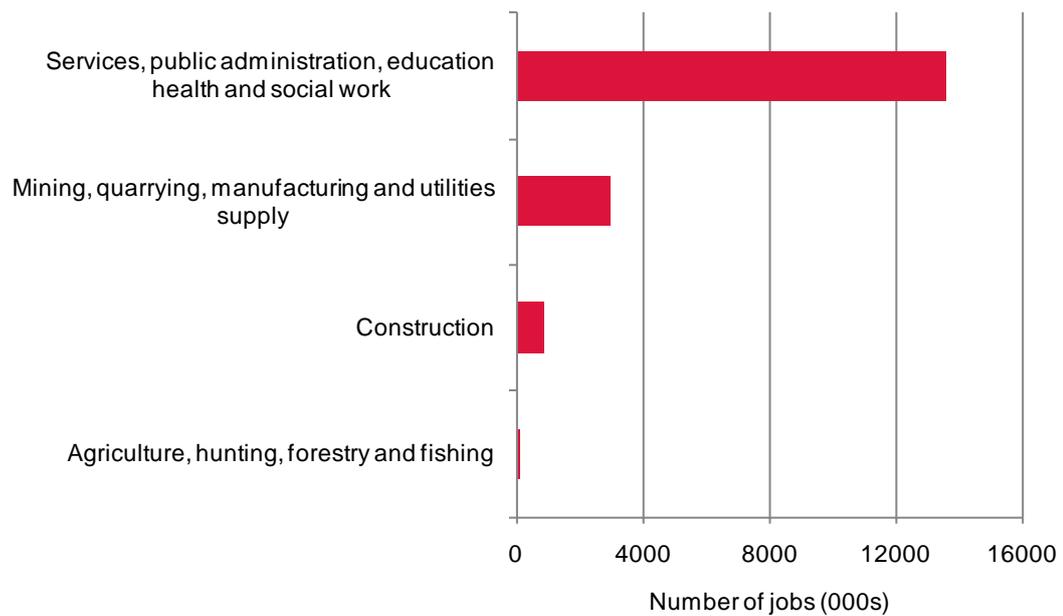
Figure A4.4: Jobs by industry grouping in 2006

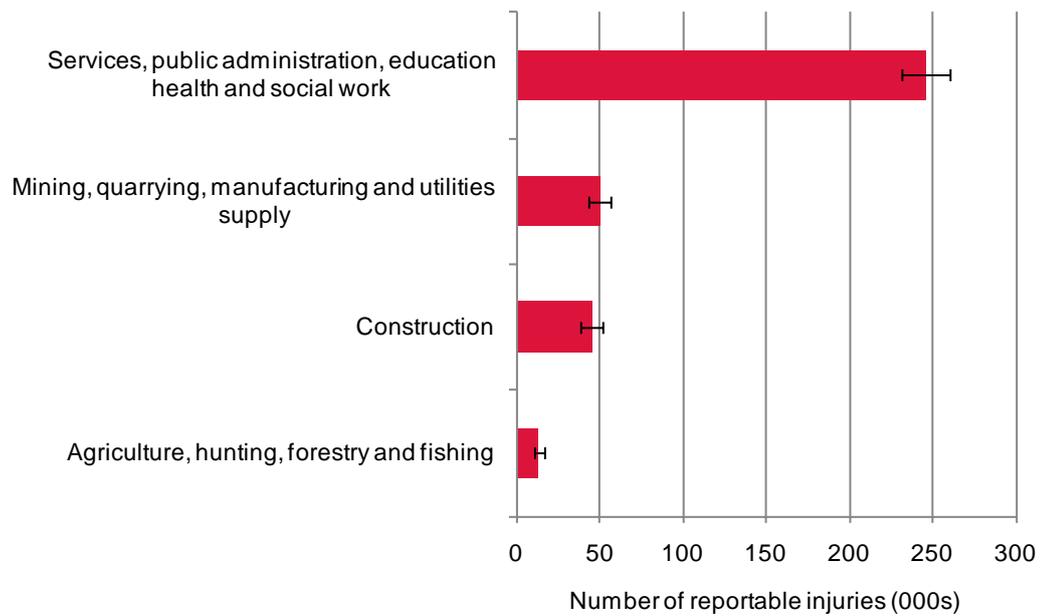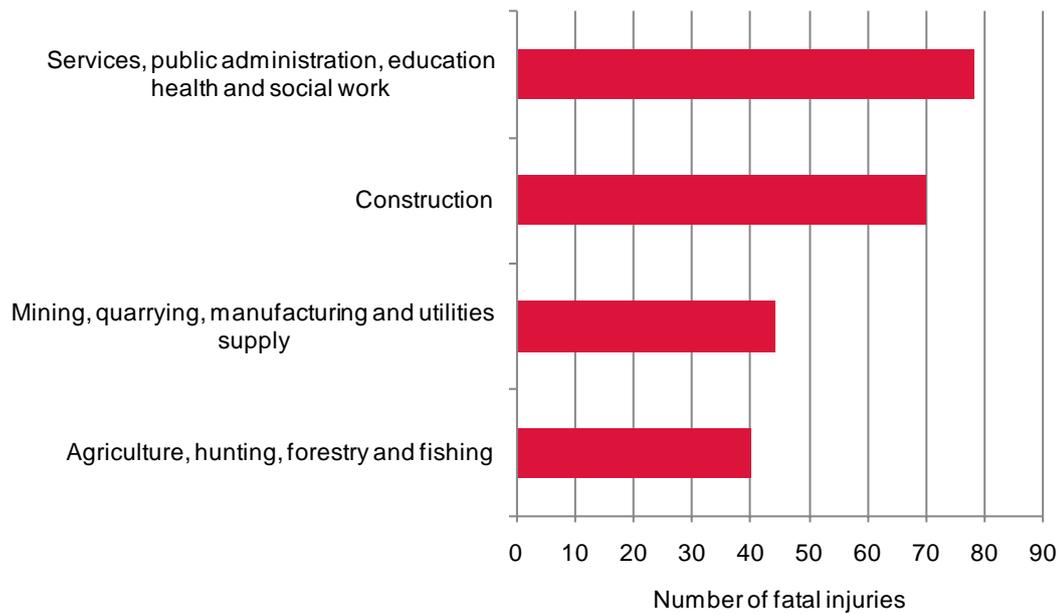Source: Annual Survey of Hours and Earnings, 2006

Figure A4.5a: Incidence of fatal injuries and new incidence cases of self-reported non-fatal reportable injuries for workers by industry grouping in 2006

Note: The red bar shows the mean value and the black whiskers show the 90% confidence interval. The figures for fatal injuries are average annual numbers reported to all enforcing authorities for 2005/06 to 2007/08. The figures for non-fatal injuries are annual average numbers estimated from the Labour Force Survey for 2006/07 and 2007/08.
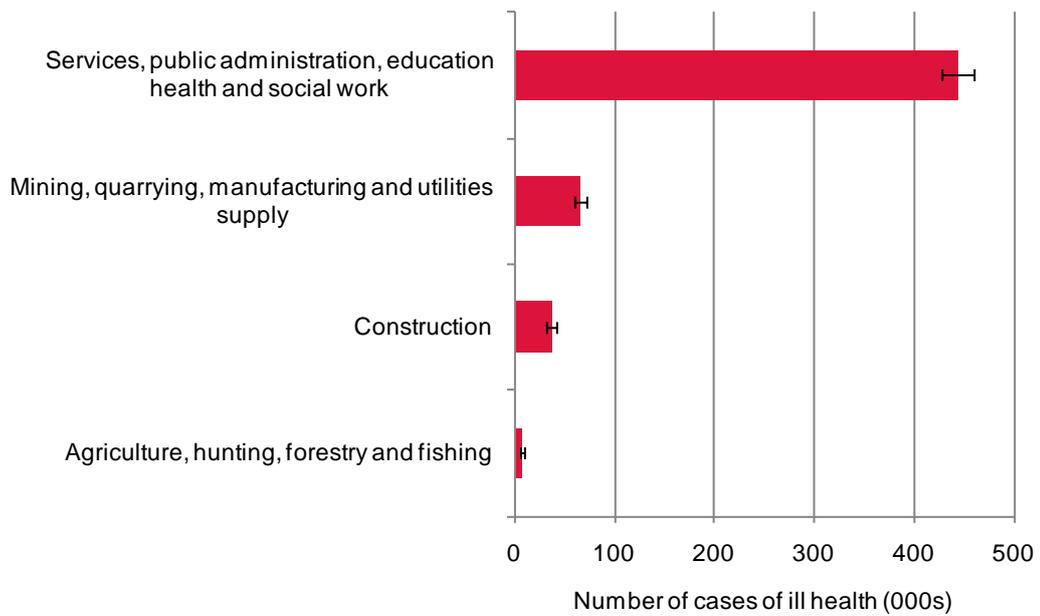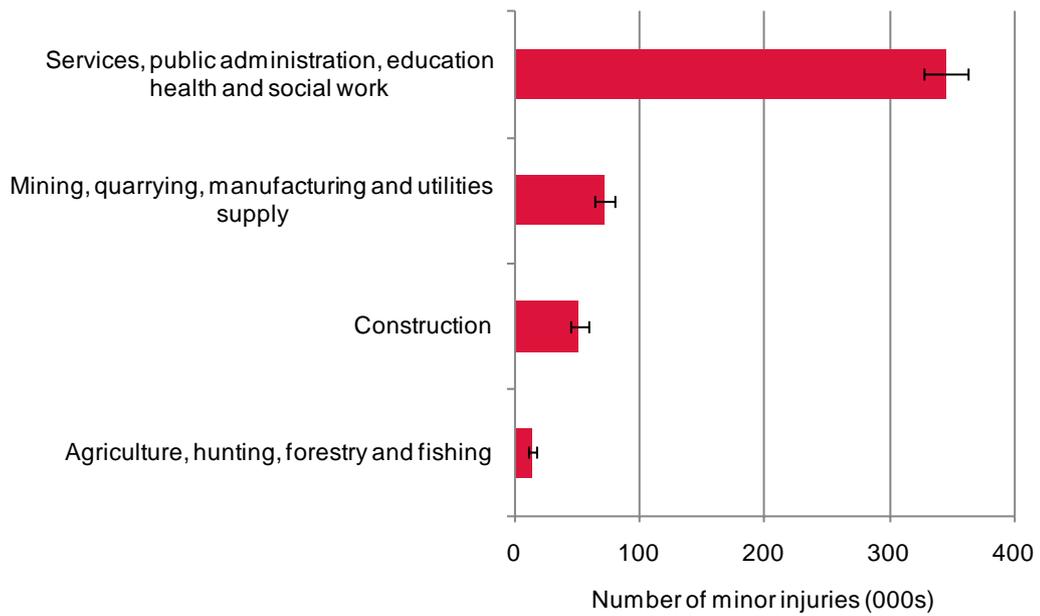
Figure A4.5b: New incidence cases of self-reported minor injuries and work-related ill health for workers by industry grouping in 2006

Note: The red bar shows the mean value and the black whiskers show the 90% confidence interval. The figures for minor injuries are annual average numbers estimated from the Labour Force Survey for 2006/07 and 2007/08. The figures for ill health are annual average numbers estimated from the Labour Force Survey for 2005/06 to 2007/08.

Industry grouping costs to society

The aggregate costs to society of fatalities and self reports by region in 2006 are presented in Table A4.2. Figure A4.6 shows the total cost values with confidence intervals calculated from the @Risk analysis. The Services grouping bears the highest cost (an estimated £12.4bn, largely reflecting the number of workers in this grouping).

Table A4.2: Aggregate costs to society of workplace fatalities, workplace injury and work-related ill health in 2006/07, broken down by industry grouping

£ millions	Workplace fatalities	Reportable injuries (major or over 3 days)	Minor injuries (under 3 days)	Ill health	Total cost
Services, public administration, education, health and social work	113	4,358	84	7,853	12,409
Mining, quarrying, manufacturing and utilities supply	64	879	17	1,149	2,109
Construction	103	804	13	665	1,584
Agriculture, hunting, forestry and fishing	53	219	3	108	383
Total	333	6,259	118	9,776	16,486

Note: Costs are shown in 2006 prices. The total aggregate cost of £16,486 million does not exactly match the value in Tables 19 and 20 because of the methodology used to correct for industry specific wage costs.
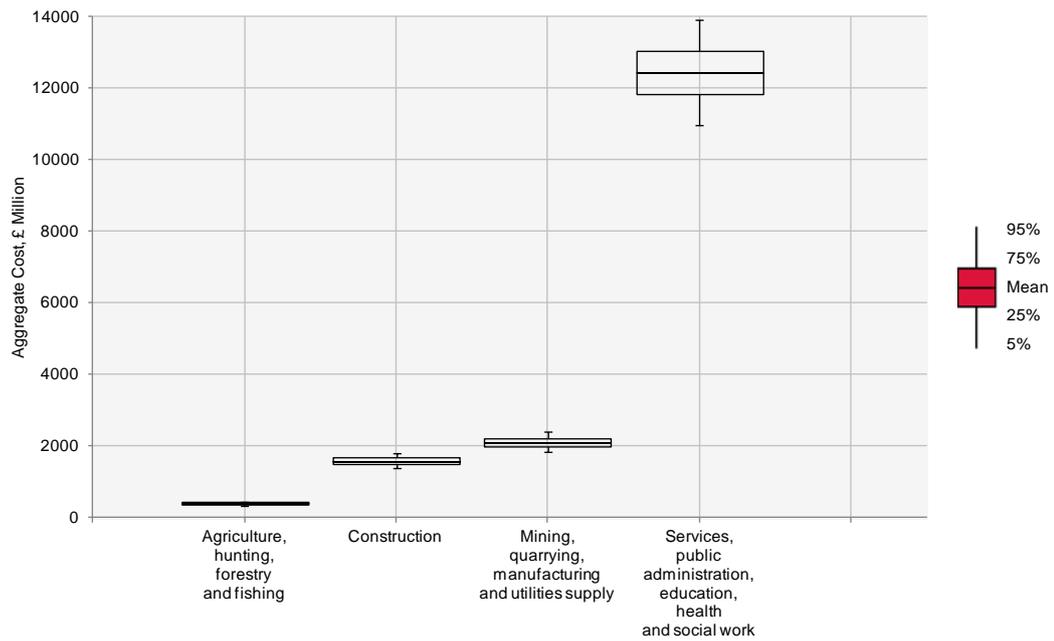
Figure A4.6: Aggregate costs to society (in £millions) of workplace fatalities, workplace injury and work-related ill health in 2006/07, broken down by industry grouping

Note: 50% confidence intervals are shown by the red box and 90% confidence intervals are shown by the black whiskers

APPENDIX 5: METHODOLOGICAL DIFFERENCES FROM PREVIOUS STUDIES

It is difficult to directly compare the cost estimates presented in this report with previous estimates because of the significant changes in methodology that have been adopted. Some of the most important changes have been highlighted in the main text, but the purpose of this appendix is to bring them all together in one place and to discuss their implications.

Differences in the aggregate cost estimate

The Gordon and Risley report estimated the aggregate cost to society at between £14.5 billion and £18.1 billion in 1995 prices, which represented between 1.9% and 2.4% of 1995/96 Gross Domestic Product (GDP). The 2001/02 interim update published by HSE used essentially the same methodology by combining illness and injury data for 2001 with unit cost data from the Gordon and Risley report, adjusted for inflation. It estimated the aggregate cost to society at between £20.0 billion and £31.8 billion in 2001 prices, which represented between 1.9% and 3.1% of 2001/02 GDP.

In contrast, the current report has a central estimate for the aggregate cost to society of £16.5 billion with a 90% confidence interval of between £14.7 billion and £18.3 billion in 2006 prices. This represents a central estimate of 1.2% of 2006/07 GDP, with a 90% confidence interval of between 1.1% and 1.3% of 2006/07 GDP. It is therefore almost half the size of the previous estimate in real terms. The main reasons for this difference are as follows:

Use of incidence data rather than prevalence data for work-related ill health

As discussed in Section 3 of the report, in order to reflect, as closely as possible, the cost of injury and health outcomes associated with current health and safety working conditions, the annual estimate of work-related ill health cases has been limited to self-reports of 'newly-occurring' cases (or incidence cases) of ill health caused or made worse by work in people who have worked in the last 12 months. This is a refinement to the previous cost estimates which were based on both 'newly-occurring' and pre-existing cases (or prevalence cases) of ill health caused or made worse by work in people who have worked in the last 12 months. The 1990 self-reported work-related ill health estimates did not allow a distinction between incidence and non-incidence cases of ill health, and whilst that distinction was available in the 1995/96 data, to ensure comparability with the earlier cost estimates the distinction was ignored. So for example Table 8 on page 14 of the Gordon and Risley report lists prevalence estimates rather than incidence estimates.

We can roughly estimate by how much the 2006/07 estimates would increase if we had based our cost estimates on prevalence cases as in previous methods. Over the four years 2005/06 – 2008/09 estimates from the LFS indicate that new incidence cases of ill health in people who had worked in the previous 12 months made up approximately 44% of the corresponding total prevalence in the year, with variation by ill health type. Scaling up the relevant costs in a similar proportion would add just less than £5 billion to the total aggregate cost estimate, with lost earnings increasing by around £1.4 billion and non-financial human costs by around £3.3 billion.

However, it is arguable that the non-incident cases should never have contributed to the non-financial costs since this is a lifetime value and to avoid double counting should be attributed to the year in which the ill health first occurred. Therefore, even had the 2006/07 cost estimate been based on prevalence rather than incidence estimates, the method should still have been revised to ensure that a non-financial cost was not placed on non-incident cases.

Exclusion of damage costs and non-injury accidents

Gordon and Risley included the costs of non-injury accidents in their aggregate totals, i.e. workplace incidents that result in damage to property and/or disruption to production that had the potential to cause injury as well, but did not in fact do so. Their rationale was that these incidents might be blamed at least in part on health and safety failings.

The incidence data for this type of accident was very limited indeed (a one-off analysis performed by HSE in 1993 for five industry case studies), so their estimates relied on an 'accident triangle' argument to say that for every one incident resulting in an injury there might be a further twenty non-injury accidents[83]. The data on the damage costs arising from non-injury accidents was equally limited.

The data available on non-injury accidents today is little better, with a scoping study performed for HSE determining that there was insufficient evidence to include the costs of non-injury accidents in the current estimates.[84] Thus, all non-injury accidents have been excluded from the aggregate cost totals. If the cost of non-injury accidents was removed from the Gordon and Risley estimates their aggregate cost total would be reduced by between £1.4 billion and £4.5 billion.

Information on those who never return to work

As noted in Section 3 of the report, the costs associated with permanent withdrawal from the workforce accounted for approximately 50% of the total cost to society in the Gordon and Risley report. They estimated that 27,000 people were forced to give up work in 1995/96 with a 90% confidence interval of between 16,000 and 42,000 people

Likewise, in the 2006/07 cost estimates, the cost associated with permanent withdrawal from the workforce accounted for a large proportion of the total cost - some 36%. The 2006/07 estimate of people who permanently withdrew from the labour market as a result of a workplace injury or work-related ill health was 19,000 with a 90% confidence interval between 14,000 and 25,000. Comparing the central estimate, this is considerably less than in 1995/96. However, it should be noted that different definitions are used to define these 'never return' cases in the two time periods (the 2008/09 Labour Force Survey, on which the latter estimate is based, included specific questions to estimate never returns). If we ignore the definitional differences though, it is likely that the difference in the two estimates can be explained by sampling error alone – this can be seen by considering the large overlap in the confidence intervals of the two estimates. In the current model, the uncertainty in this 'never returns' estimate is reflected in the confidence interval around the cost estimate.

For comparison purposes, if the 1995/96 never returns estimate is included in the current model as the estimate for never returns in 2006/07, then we would get an aggregate cost of £18.9 billion with a 90% confidence interval of £15.0 billion to £22.7 billion. Whilst this is an increase of £2.4 billion in our central estimate of the aggregate cost for 2006/07, considering the range of uncertainty around the estimates, the two cost estimates are not significantly different.

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[83] The ratio varies from industry to industry, but the average value is one to twenty, see paragraph 57 on page 23 of the Gordon & Risley report.

[84] HSE Research Report: 'The costs of non-injury accidents. Scoping study. Prepared by the Health and Safety Laboratory for the Health and Safety Executive 2007, Available at: www.hse.gov.uk/research/rrpdf/rr585.pdf

Non-financial human costs

Appendix 3 describes in some detail the methodology used by Gordon and Risley and the revised methodology used in the current cost model. There are significant differences in the final values of the non-financial human costs for non-fatal injuries and ill health in our cost model compared to Gordon and Risley's estimates (after allowing for indexation by GDP per capita). This becomes most apparent in the appraisal values.

One of the most significant differences is that Gordon and Risley used a value of £147,100 in 1995 prices for permanent incapacity following injury and £136,100 in 1995 prices for permanently incapacitating ill health. They assumed that these figures were appropriate for the 3,000 never returns due to injury and the 24,000 never returns due to ill health respectively. These values are based on the average of injury category R and S, but without any strong justification (see Appendix 3). In the current cost model we assume that injury category S applies to all never return cases, based on the observation that the average age of a never return is 54 which is much older than the early 40's average age applicable to the original road traffic accident willingness to pay surveys.

If instead of injury S we used the average of injury R and injury S in our cost model for the 19,000 never returns, our aggregate cost estimate would increase by £0.9 billion. The sensitivity of the costs estimate to such a small change in assumptions is obviously an important factor that should be acknowledged when the cost model estimates are cited. This highlights the need for further research into the valuation of non-financial human costs, see Section 9.

Loss of output

As noted in Section 7, Gordon and Risley estimated that the marginal loss of output to the economy as a whole from work related injury and ill health could be equated with the marginal loss of input by adding 29% non-wage labour costs to the gross loss of earnings calculated for the absent employees. We argued that most of these overheads would not in fact continue so could not be counted as an ongoing extra cost. The true additional loss to the economy as a whole is more accurately described as the lost profit or lost value added that the employees labour would normally produce, which is very hard to put a figure on but is likely to be very small at the margin. The cost model therefore assumed a zero% mark-up on top of the lost gross earnings.

If instead of zero% we used Gordon and Risley's 29% in the cost model, our aggregate cost estimate would increase by approximately £1.6 billion.

Use of age adjusted salaries

The cost model uses weighted average salaries to take account of the fact that (i) part time workers earn slightly less per hour on average than full time workers and (ii) average salaries tend to increase with age from age 20 to 45, but then decrease again until retirement. This is particularly significant when calculating the loss of future earnings suffered by those who never return to work, whose average age is 54. Gordon and Risley used the full time wage rate averaged across all employees in each sector, so it is likely that they will have overestimated the loss of earnings suffered by the never return population.

The costs to Britain of workplace injuries and work-related ill health in 2006/07

Workplace fatalities and self reports

This research report presents an updated method for estimating the aggregate 'costs to Britain' of workplace injuries and new cases of work-related ill health, along with updated unit costs associated with an individual workplace injury or new case of ill health ('appraisal values').

The previous aggregate cost estimates were produced for 2001/02 and the previous unit cost estimates were in 2006 prices. The unit costs had developed separately and with a slightly different methodology to the aggregate costs and so were not strictly comparable.

This report provides a comprehensive update of the costs to Britain analysis, and includes:

- An improved cost estimation methodology, making best use of the data available at the time the project was undertaken.
- As close an estimate as possible of the aggregate costs to Britain of workplace fatalities, workplace injuries, and new cases of work-related ill health associated with working conditions in the financial year 2006/07.
- Corresponding estimates of the appraisal values for 2006/07 that are fully consistent with the aggregate cost estimates.
- Putting the aggregate costs and appraisal values on the same footing by calculating both in a single integrated spreadsheet model.

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