



safe work australia

The Cost of Work-related Injury and Illness for Australian Employers, Workers and the Community: 2012–13



Canberra
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EXECUTIVE SUMMARY

In 1995, an Industry Commission study¹ estimated that only 25 per cent of the total cost of work-related injury and disease was due to the direct costs of work-related incidents. The remaining 75 per cent was accounted for by indirect costs such as lost productivity, loss of income and quality of life. Using the 1992–93 financial year Australian National Accounts² estimate of \$4.83 billion in payments to household from workers' compensation schemes as an estimate of direct costs, led to an estimate of total cost of work-related injury and disease of **\$20 billion** for the 1992–93 financial year.

The Industry Commission methodology defined a range of indirect cost items covering various economic agents (employers, workers and the community) and level of severity. The average costs associated with each category were combined with estimates of the number of work-related incidents to produce an estimate of total costs.

In 2004, as part of its strategy of communicating information on the impact of occupational injury, disease and death, the National Occupational Health and Safety Commission (NOHSC) revisited this estimation methodology. Where new or emerging data sources allowed, the update expanded on the previous methodology by including additional estimates for indirect cost items that were identified but not included in the previous study.

The resultant methodology (discussed in detail in Section 1 of this report) and economic cost estimate was reviewed by independent consultants,^{3,4,5} to examine and enhance the robustness of the methodology and data sources. The recommendations from these reviews were incorporated into the original NOHSC methodology. The results of the analysis were endorsed at a meeting of the NOHSC Information Committee and published in 2004⁶. The study estimated the total costs of workplace injury and illness to the Australian economy for the 2000–01 reference year to be **\$34.3 billion**. This total is equivalent to 5 per cent of Australian Gross Domestic Product (GDP) for the 2000–01 financial year.

In 2008 and 2012, the Australian Safety and Compensation Council (ASCC) and Safe Work Australia updated this estimate, using the approved methodology, for the 2005–06 and 2008–09 reference financial years. The reference periods were chosen to align with the most recent Australian Bureau of Statistics (ABS) Work-related Injuries Survey (WRIS) data release⁷.

The total economic cost for the 2005–06 financial year was estimated to be **\$57.5 billion**, representing 5.9 per cent of GDP for the 2005–06 financial year⁸, while the estimated cost for the 2008–09 financial year was **\$60.6 billion** or 4.8 per cent of 2008-

1 Industry Commission, *Work, Health and Safety*, Report No. 47, September 1995.

2 ABS Catalogue 5204.0, Australian System of National Accounts, 1992–93.

3 Indirect Costs of Work Related Injury and Disease, Review of the Estimation Methodology, Report by The Allen Consulting Group to NOHSC, July 2003.

4 Review of the Methodology and Estimates of Indirect Costs of Workplace Injury/Disease, Report by The Allen Consulting Group to NOHSC, November 2003.

5 Costs of Workplace Injury and Illness: reviewing the estimation methodology and estimates of the level and distribution of costs, Report by Access Economics P/L, March 2004.

6 The Cost of Work-related Injury and Illness for Australian Employers, Workers and the Community; National Occupational Health and Safety Commission, August 2004.

7 ABS Catalogue 6324.0, Work-Related Injuries 2009–10, December 2010. This survey forms the basis of the estimate of number of cases.

8 ABS Catalogue 5204.0, Australian System of National Accounts, 2005–06.

09 GDP. It should be noted that this estimate represents foregone economic activity, and not the proportion of GDP that is lost as a result of work-related injury and illness.

With the release of WRIS data for the 2013-14 financial year, Safe Work Australia has re-estimated the total economic cost of work related injury to the Australian economy for the 2012-13 reference year. The total economic cost for the 2012–13 financial year is estimated to be **\$61.8 billion**, representing 4.1 per cent of GDP for the same period.

The relative growth in average weekly earnings when compared with current price GDP is a significant driver in the estimated cost as a proportion of GDP. During the period from 2008–09 to 2012-13, GDP grew by 21 per cent while average weekly earnings increased by 23 per cent.

In terms of the burden to economic agents, 5 per cent of the total cost is borne by employers, 74 per cent by workers and 21 per cent by the community. The trends over the three iterations of this report are for an increasing proportion of costs borne by workers and a decreasing proportion of costs borne by the community. This difference is mainly accounted for by the growth in average weekly earnings and the effect this has on human capital costs and the distribution between worker and community. This issue is discussed in detail on page 33 of the report. The three estimates produced in this series are summarised below in Table 0.1.

This methodology is based on an ‘ex-post’ approach to assigning costs (i.e. after the incident), in which the costs of incidents occurring in the reference year only are considered. Under this methodology, workers’ compensation premiums paid by employers are not considered as a cost to employers, rather the distribution of payments to injured workers from money received from workers’ compensation premiums are considered as a transfer cost to society.

If the \$8.4 billion in workers’ compensation premiums paid by Australian employers in the 2012-13 financial year⁹ were to be redistributed using an ‘ex-ante’ approach (i.e. before the incident), the total cost borne by employers would be 19 per cent and the cost borne by the community would be 4 per cent. The differences between these approaches affect the distribution of costs but not the level of total costs. Economic costs borne by workers remain the same under either approach.

Economic costing is not an exact science. Cost estimates depend on the particular costing approaches used, the range of cost components that can be estimated, the quality of available data and the value of key parameters. The assumptions relating to the values of key parameters in this study have been chosen to be deliberately conservative. Appendix 3 outlines the results of an analysis of the sensitivity of the total cost estimate to changes in the value of key parameters. The estimated cost derived from the baseline parameter values is shown to lie towards the lower end of the range of cost estimates produced by this analysis.

It is important to recognise that the cost estimate presented in this report is an estimate of the human cost of work-related injury and illness, and relates to the outcomes of work-related injury and illness that occur within the chosen reference year (2008–09 for

⁹ ABS Catalogue 5204.0, Australian System of National Accounts, 2012-13.

this study). It does not include costs that cannot be specifically related to injury or illness to employees (such as damage to property and loss of company image). The cost estimate also represents only one side of the work health and safety cost equation. For example, the costs incurred by employers for compliance with work health and safety regulations and prevention activities are not considered within the scope of the current study.

The initial study and cost estimate for 2000–01 included an appendix on the cost of pain and suffering, based on the value of a statistical life year. No such estimates have been included in this study, which instead focuses on the baseline estimates of economic costs.

Table 0.1: Comparison of estimates of the economic cost of work-related incidents

Estimation period	Economic agent	Estimated cost (\$b)	GDP (\$b) a	Costs as % of GDP	Australian Workforce (millions) b
2000–01	Total	\$34.3	\$689.3	5.0%	9.09
	Employer	3%			
	Workers	44%			
	Community	53%			
2005–06	Total	\$57.5	\$967.5	5.9%	10.20
	Employer	4%			
	Workers	49%			
	Community	47%			
2008–09 ^c	Total	\$60.6	\$1 253.1	4.8%	10.93
	Employer	5%			
	Workers	74%			
	Community	21%			
2012–13	Total	\$61.8	\$1 521.1	4.1%	11.48
	Employer	5%			
	Workers	77%			
	Community	18%			

a ABS Catalogue 5204.0, Australian System of National Accounts, 2012–13.

b ABS Catalogue 6202.0, Labour Force Australia, September 2014.

c Due to significant revisions in the methodology, the 2008–09 and 2012–13 estimates should not be compared with the two previous estimates.

CONTENTS

Creative Commons	1
Disclaimer	1
EXECUTIVE SUMMARY	2
CONTENTS.....	6
LIST OF TABLES	7
LIST OF ABBREVIATIONS.....	8
INTRODUCTION	9
SECTION 1. METHODOLOGY	10
Methodological considerations	10
Applying the methodology	11
Measuring cases using an incidence approach.....	11
Distributing costs using an 'ex-post' approach	13
Conceptual categories for cost items	13
Measuring lost productivity.....	15
Identifying the levels of severity of work-related incidents	17
Measurement of indirect cost items.....	19
Distribution of indirect cost items by severity category	20
Discounting future monetary values and the discount rate	20
Determining the number of incidents in each severity category.....	21
Determining the average costs of a work-related incident	26
Calculation and distribution of total costs	26
SECTION 2. RESULTS	27
APPENDIX 1. INPUTS DERIVED IN THE PROCESS OF ESTIMATING TYPICAL COSTS	35
APPENDIX 2. ECONOMIC COSTS BY JURISIDCTION.....	41
APPENDIX 3. SENSITIVITY ANALYSIS.....	42
REFERENCES	44

LIST OF TABLES

Table 0.1: Comparison of estimates of the economic cost of work-related incidents	5
Table 1.1: Economic costs borne by the employer, worker and the community.....	15
Table 1.2: Definition and labelling of severity categories.....	18
Table 1.3: Definitions and data sources for indirect cost items.....	19
Table 1.4: Distribution of indirect cost items by severity category	20
Table 1.5: Estimates of disease morbidity due to work-related exposures, 2012–13 ^a	23
Table 1.6: Work-related injuries by duration of absence and nature, 2012–13 ^a	23
Table 1.7: Number and distribution of work-related incidents by severity category, 2012–13....	24
Table 1.8: Average duration of absence (in weeks) by nature and severity category, Australia, 2012–13.....	25
Table 1.9: Average costs (\$ per incident) for work-related incidents, Australia, 2012–13 ^a	26
Table 2.1: Total costs of work-related injury and illness (\$ million), Australia, 2012–13	27
Figure 2.1: Distribution of total costs (\$b) by economic agent and severity, Australia, 2012–13	28
Table 2.2: Total cost (\$ billion) and average cost (\$ per work-related incident) for work-related injury and illness, Australia, 2012–13.....	28
Table 2.3a: Cost (\$ million) of work-related injury and illness, by location of workplace, 2012–13 ^a	29
Table 2.3b: Cost (\$ million) of work-related injury and illness, by industry of workplace, 2012–13 ^a	30
Table 2.3c: Cost (\$ million) of work-related injury and illness, by sex and age group, 2012–13 ^a	31
Table 2.3d: Cost (\$ million) of work-related injury and illness, by occupation group, 2012–13 ^a . 31	31
Table 2.3e: Cost (\$ million) of work-related injury and illness, by cause of injury or illness, 2012–13 ^a	32
Table 2.3f: Cost (\$ million) of work-related injury and illness, by type of injury or illness, 2012–13 ^a	32
Table 2.4: Unit costs (\$ per incident) and total costs (\$ million) of work-related injury and illness by severity and nature, 2012–13.....	33
Table 2.5: Distribution (%) of total cost of work-related injury and illness by severity category, 2012–13.....	33
Table 2.6: Distribution of costs and incidents (% of total costs and total incidents) of work-related injury and disease by severity, 2012–13.....	34
Table A1.1: Definitions, methods and assumptions for deriving key inputs, employer cost items	35
Table A1.2: Definitions, methods and assumptions for deriving key inputs, worker cost items .	36
Table A1.3: Definitions, methods and assumptions for deriving key inputs, community cost items	37
Table A1.4: Parameters required for cost estimation.....	38
Table A1.5: Parameters specific to severity and nature categories.....	39
Table A1.6: Summary of cost estimates for injury and illness, \$m, 2012–13 ^a	40
Table A2.1: Cost of work-related injury and illness for Australian jurisdictions, by economic agent, conceptual cost category and severity category. 2012–13 (\$ million) ^a	41
Table A3.1: Parameter estimates.....	42
Table A3.2: Cost estimate ranges for selected parameter changes	43

LIST OF ABBREVIATIONS

ABS Australian Bureau of Statistics

AIHW Australian Institute of Health and Welfare

ADMINC Administration Costs

ANA Australian System of National Accounts (ABS Catalogue No. 5204.0)

ASCC Australian Safety and Compensation Council

AWE Average weekly earnings (total earnings)

AWOTE Average Weekly Ordinary Time Earnings (excluding overtime)

CPI Consumer Price Index (ABS Catalogue No. 6401.0)

CPM Comparative Performance Monitoring Report

CRS Commonwealth Rehabilitation Service

DFaCS Commonwealth Department of Family and Community Services

GDP Gross Domestic Product

HKC Human Capital Costs

MEDC Medical Costs

NDS National Dataset for Compensation-based Statistics

NOHSC National Occupational Health and Safety Commission

PDC Production Disturbance Costs

PV Present Value

RBA Reserve Bank of Australia

TRANSC Transfer Costs

WCI ABS Wage Cost Index (Catalogue No. 6345.0)

WRIS ABS Work-related Injuries Survey (Catalogue No. 6324.0)

WRMC Workplace Relations Ministers' Council

INTRODUCTION

1. Work-related injuries, illnesses and deaths impose costs on employers, workers and the community. These include both direct costs and indirect costs. Direct costs include items such as workers' compensation premiums paid by employers or payments to injured or incapacitated workers from workers' compensation jurisdictions. Indirect costs include items such as lost productivity, loss of current and future earnings, lost potential output and the cost of providing social welfare programs for injured or incapacitated workers. The level of costs borne by each economic agent varies with the severity of the injury or disease. While measures of direct costs are understood and reasonably simple to measure, these costs cover only a fraction of the total cost of work-related injury and disease.

2. The purpose of this study is to update the estimated cost of work-related injury and illness based on the methodology developed and applied in 2004 by the National Occupational Health and Safety Commission (NOHSC). The methodology is an adaptation of a 1995 Industry Commission report¹⁰ with further modifications based on the recommendations of independent reviews of the method by the Allen Consulting Group¹¹ and Access Economics¹². This methodology was endorsed by the NOHSC Information Committee in September 2004¹³.

3. The methodology for the current update has been revised to provide more robust estimates of the number of full incapacity cases and the extent of disease morbidity. These changes are discussed in more detail in the *Methodology* section of this report. The current update is based on the 2012–13 financial year as a reference year.

4. Section 1 of this report summarises the methodology used in deriving the estimate, describing each step in the process of estimating total costs. The major steps include: developing a framework for classifying costs in terms of the burden to economic agents and the major sources of indirect costs; classifying incidents in terms of severity and nature, and estimating the number of incidents and the typical cost associated with an incident in each category.

5. Section 2 summarises the major findings of the study, giving the breakdown of average and total costs by various factors including location, economic agent, and the severity and nature of the incident.

6. A detailed description of the process for deriving typical costs by severity category and nature is given in Appendix 1, while a detailed breakdown of cost by jurisdiction is presented in Appendix 2. Appendix 3 details the results of a sensitivity analysis of the method to changes in key parameters and assumptions.

10 Industry Commission, *Work, Health and Safety*, Report No. 47, September 1995.

11 Review of the Methodology and Estimates of Indirect Costs of Workplace Injury/Disease, report by the Allen Consulting Group to NOHSC, November 2003.

12 Costs of Workplace Injury and Illness: reviewing the estimation methodology and estimates of the level and distribution of costs, Report by Access Economics P/L, March 2004.

13 The Cost of Work-related Injury and Illness for Australian Employers, Workers and the Community; National Occupational Health and Safety Commission, August 2004.

SECTION 1. METHODOLOGY

Methodological considerations

7. The economic costs included in this study are difficult to measure and cannot be estimated from a single data source. An estimation methodology must be employed that combines the relevant information in a robust and transparent manner. The most important consideration is the nature of the data on which the number of cases is based. For this study, the number of cases is defined by combining details of new workers' compensation cases for the reference year and estimating the future cost associated with each new case and estimates from the Australian Bureau of Statistics (ABS) Work-related Injuries Survey (WRIS). The estimate of the number of new cases is used as a proxy for the ongoing cost of cases from previous reference years. This characteristic of the data allows the aggregation of costs for each new case over the reference year and implies that an 'ex-post' approach to measuring costs (considering the cost of a case after it has occurred) is best suited to the current study.

8. The basic methodology for deriving an estimate of economic costs is to identify and define the categories of economic costs affecting the major economic agents, namely employers, workers and the community. Using the severity of an injury or disease as a major driver of average cost, a scale for measuring incidents by the level of severity is created. This scale is used to calculate and aggregate total costs to determine the overall level of indirect costs.

9. For various estimates, a range of values could be appropriate for use in the estimation process. Where possible in this study, parameter values are chosen to be deliberately conservative. By applying this rationale to the estimation of parameter values, we believe that the estimate of total costs will also be conservative and the 'true' value of costs is likely to be higher than the value estimated.

10. The cost estimation methodology is based on the concept of the 'human cost' of work-related injury and illness. Essentially, workplace incidents can be thought of as involving damage to humans or property, or a combination of the two. Only those costs associated with actual injuries or illnesses are included in the cost estimate under the human cost framework. As an example of the human cost approach, the costs associated with loss of goodwill and corporate image and the cost of machinery damage and replacement are not included in total costs. These costs can be incurred as a result of workplace incidents in which no injuries occur to employees, or the costs can be unrelated to number of injuries or illnesses that occur as a result of the incident.

11. The nature of the compensation based data on which the estimate of work related injuries and illnesses is based means that the costs associated with incidents where no injury or illness occurs cannot be reliably identified. For this reason, it is conceptually more robust to exclude all such costs and concentrate only on human costs in the current study.

Applying the methodology

12. The economic costs associated with work-related injury and illness are estimated for a range of indirect cost items over five severity categories, ranging from short periods off work with full return to normal duties to full incapacity and fatality (see paragraph 44 and Table 1.2 for the definitions of each severity category).

13. The methodology for deriving the estimate for total costs can be categorised by the following steps:

1. Identify the major categories of economic costs borne by economic agents (employers, workers and the community)
2. Determine the best source of measurement for each cost item
3. Define the levels of severity of injury or disease to differentiate between incidents with different cost structures
4. Identify which cost items apply to each severity category
5. Determine the number of incidents which fall into each severity category, and the average duration of time lost for a typical incident in each category
6. Calculate the average cost of a typical incident in each severity category by aggregating the typical costs associated with each cost item, and
7. Calculate the total cost of all work-related incidents by combining the typical cost of an incident with an estimate of the number of such incidents and aggregating over all classes of incidents.

14. The following sections discuss each of these steps and the important methodological considerations used to underpin the total cost estimate. Full details of the estimation of typical costs for each category of incident are given in Appendix 1.

Measuring cases using an incidence approach

15. The Access Economics review¹⁴ of the relevant literature identified two key approaches for dealing with the issue of measuring annual occupational injuries and illnesses: the incidence approach and the prevalence approach. The distinction between the approaches is that the incidence approach measures new cases occurring during the reference year, while the prevalence approach measures all cases (whether new or ongoing) in the system at a given point in time in the reference year.

16. The incidence approach assesses the number of people entering the compensation (or medical) systems during a particular year as a result of work-related incident or illness and the costs (both current and expected future costs) associated with those cases. Since only new cases are measured under the incidence approach, in order to estimate total costs the expected future cost of new cases over the lifetime of a case is used to proxy the cost in the reference year of cases that were already in the system at the start of the current reference year.

¹⁴ Access Economics (2004) Costs of Workplace Injury and Illness to the Australian Economy: Reviewing the Estimation Methodology and Estimates of the level and distribution of costs, Reports for the National Occupational Health and Safety Commission, March 2004.

17. The alternative prevalence approach assesses the number of people within the compensation or medical systems at a given point in time, regardless of when the injury or illness occurred. Under this approach, costs are generally allocated in a top-down manner, where total expenditures for a given year are proportioned across the identified categories of injury or illness. While the prevalence approach to measuring total cases would provide the best estimate of total costs, since costs would be estimated over the total number of cases currently in the 'system' at a given point during the reference year, it is difficult to obtain accurate prevalence data relating to occupational injury or illness. Using inaccurate or incomplete prevalence data is likely to result in an underestimate of the number of cases and therefore produce an underestimate of total costs.

18. The methodology presented in this paper is based on an incidence approach to measuring total work-related incidents. Accepted workers' compensation claims have been identified as the best single source for estimating the number of occupational injuries and illnesses for a given year. The workers' compensation data on which the estimate of the total number of incidents is based allows the identification of new accepted workers' compensation claims for the reference year and thus readily lends itself to using the incidence approach to estimate the number of cases. This information is supplemented with the WRIS, Safe Work Australia estimates of injury fatalities¹⁵ and disease fatalities¹⁶ to form the basis for the total number of cases.

19. The incidence approach allows a better estimate of the economic cost of disease cases, since it allows the future costs for new cases to be followed over the expected lifetime of the case. Under a prevalence approach, it would be difficult to identify and cost a case involving a work-related disease if that case had left the compensation system (as would occur if a lump-sum payment had occurred) but was still incurring medical and other costs to the person in the ensuing years.

20. Based on an incidence approach to measuring total cases, a key characteristic of the methodology is the inclusion in the total cost estimate of the expected future costs of incidents occurring in the reference year. The costs that an injury or disease imposes in future years are discounted to present values. This provides a measure of the costs in the reference year associated with injuries and illnesses occurring in previous years. This approach is known as the *lifetime cost* approach, and provides an indicator of the financial and economic benefits of reducing work-related incidents. In order to proxy the costs incurred in the current reference year from cases occurring in previous years, the costs incurred into the future from these cases are estimated using present value calculations over the expected lifetime of the case.

21. The *lifetime cost* approach makes the assumption that the level and structure of current costs will accurately reflect ongoing costs into the future. In the event that advances in health care technology and treatments will affect the level and structure of costs, the lifetime cost approach may distort the estimate of future costs based on current treatment and costs. In this discussion, the assumption is made that current treatment costs will be a good predictor of the type and level of future costs.

15 Safe Work Australia (2010), Work-related Traumatic Injury Fatalities, Australia 2007-08, Safe Work Australia, December 2010.

16 Access Economics (2003b), Review of the methodology and estimates of workplace fatalities, Report to the National Occupational Health and Safety Commission, September 2003.

Distributing costs using an ‘ex-post’ approach

22. As discussed in the executive summary, the methodology is based on an ‘ex-post’ approach in which costs are attributed to incidents after they occur and as a direct result of the incident. The ‘ex-post’ view of costs is generally associated with the incidence approach to measuring total cases.

23. The alternative view is an ‘ex-ante’ approach, where the expected costs of incidents are estimated in advance of the event or incident. This approach is traditionally associated with a prevalence approach to measuring total cases, where total expenditures for a given year are apportioned across the categories of injury or illness. This approach is also known as a ‘top-down’ estimation process.

24. The nature of the compensation-based data on which the estimate of the total number of cases is based lends itself to an ‘ex-post’ estimation process. The current and future costs associated with each case can be assigned individually (since the number of cases and the nature of each case is known) and the total cost estimated by aggregating the cost of each case and/or cost component from the ‘bottom-up’.

25. An important distinction between these two views is the treatment of workers’ compensation premiums paid by employers. Under the ‘ex-post’ treatment, such payments are not considered as a cost to the employer but treated as a burden to the community as compensation payments are re-distributed to injured and ill workers. Under the ‘ex-ante’ treatment, workers’ compensation premiums are considered as a cost to employers for all incidents that will occur in the reference year. Paragraph 72 in the results section shows the impact on the distribution of total costs of adopting the ‘ex-ante’ view. It should be noted that the choice of the method for assigning costs will affect the distribution of costs between economic agents but not the level of total costs.

Conceptual categories for cost items

26. Identifying the proportion of costs borne by economic agents (employers, workers and the community) is an important facet of the analysis. Estimating the burden of economic costs will allow an understanding of the incentives on employers and regulators to provide a safe workplace. The distribution of the burden of costs is achieved by devising a framework that defines the major aspects of total costs and assigns the proportion of these cost groups to each of the economic agents.

27. The classification structure for economic costs is based on the following conceptual cost groups:

- production disturbance costs – costs incurred in the short term until production is returned to pre-incident levels
- human capital costs – long run costs, such as loss of potential output, occurring after a restoration of pre-incident production levels
- medical costs – costs incurred by workers and the community through medical treatment of workers injured in work-related incidents
- administrative costs – costs incurred in administering compensation schemes, investigating incidents and legal costs

- transfer costs – deadweight losses associated with the administration of taxation and welfare payments, and
- other costs – includes costs not classified in other areas, such as the cost of carers and aids and modifications.

28. Table 1.1 summarises the conceptual cost groups used to categorise economic costs, and the cost components in each conceptual group that are borne by the key economic agents (employers, workers and society).

29. In Table 1.1, Total costs (T) are the sum of production disturbance costs (PDC), human capital costs (HKC), medical costs (MEDC), administrative costs (ADMINC), transfer costs (TRANC) and other costs (OTHERC).

30. Each item can be further sub-categorised by severity level, compensated or uncompensated status, and disease or injury. For each item, total cost is the sum of costs borne by employers, workers and society. Tables A1.1 to A1.3 in Appendix 1 summarise cost items by their burden on each economic agent.

31. In addition to these cost items, estimates can also be included for the total cost of pain and suffering and early death to workers experiencing work-related injury and illness. The previous study in 2000–01 included an appendix on the cost of pain and suffering, based on the value of a statistical life year. No such estimates have been included in this study, which instead focuses on the baseline estimates of economic costs.

Table 1.1: Economic costs borne by the employer, worker and the community

Conceptual group	Total (T)	Employer (E)	Worker (W)	Society (S)
Production disturbance costs	Value of production (inc. overtime)	Overtime premium Employer excess payments	Loss of income prior to RPR ^a , net of compensation, welfare and tax	Compensation and welfare payments transferred to worker for temporary loss of wage; tax losses prior to RPR
Human capital costs	Staff turnover costs	Sick leave Staff turnover costs	Zero	Zero
	Present value of earnings before incident minus earnings after incident	Zero	Loss of income after RPR, net of compensation, welfare and tax	Compensation and welfare payments for lost income earning capacity; tax losses after RPR
Medical costs	Medical and rehabilitation costs incurred as a result of the injury	Threshold medical payments	Gap payments	Compensation medical payments
			Private health insurance payments	Public health system payments
Administrative costs	Legal costs	Real legal costs incurred plus fines and penalties	Real legal costs incurred	Real legal costs incurred
	Investigation costs	Employer investigation costs	Zero/negligible	Deadweight costs of enforcement minus fines and penalties credit Real costs of running the compensation system (including investigation of claims)
	Travel costs	Zero/negligible	Travel costs net of compensation & concessions	Compensation for travel costs
Transfer costs	Cost of funeral today minus present value of future cost	Zero	Net costs of bringing forward funeral	Travel concession Compensation for funeral costs
	Real deadweight costs of transfer payments (welfare and tax)	Negligible	Zero (accounted for in netting other items)	Deadweight costs of welfare payments (DSP, SA, Mobility Allowance, Rent Assistance)
Other	Carers	Zero	Carer costs net of carer payment/allowance	Deadweight costs of tax losses Payments to carers plus deadweight cost
	Aids, equipment and modifications	Zero	Aids etc (net cost after reimbursements)	Reimbursements for aids etc plus deadweight cost

Source: Access Economics P/L 2004 Report on 'The Costs of Work-related Injury and Illness'
a RPR time to return or permanent replacement of injured worker

Measuring lost productivity

32. The distinction between production disturbance costs and human capital costs can be thought of in terms of the time period covered by the reduction or loss of productivity. The two distinct periods that categorise a serious workplace incident are:

- the short term initial disruption until production is restored (either by the worker returning to work if possible or being replaced), and
- the longer term period when there is potential loss or reduction of the labour resource as a result of the workplace incident.

33. Two possible approaches to measuring lost productivity are: human capital (lost wages) and the frictional method. The human capital method takes a longer term approach, assuming that if a worker is unable to return to work, or has a reduced capacity on return, then the productive capacity of the economy is reduced as a result. The friction method values the costs of lost production in the short term, while assuming that in the longer term the structural unemployment in the economy will provide a worker able to compensate for the lost potential from the injured worker.

34. In the model used for this analysis, frictional costs are included in the production disturbance costs item, while the human capital costs item covers the long term costs of injury in terms of lost output and potential. In line with the recommendation of the Access Economics review, human capital costs are included in total costs, since foregone production (as measured by the friction approach) is only one component of total cost and lost or reduced human resources are also a significant and real economic cost of work-related incidents. While some lost potential is likely to be 'picked-up' by previously unemployed workers entering the labour force, it will not be entirely replaced.

35. As an example, consider the case of a worker suffering a full incapacity disease at age 46, earning the average weekly wage of \$1 313 per week. In the short term, production disturbance costs for the individual are equal to the value of the worker's wages (plus on-costs and overtime) over the time lost before replacement (8.5 weeks), or \$19 650. In the long term, the human capital costs are equal to the present value of the individual's expected income over the period between leaving work and retirement. Assuming the worker would have retired at age 64, and using a discount rate of 1.64 per cent (see paragraph 49), the cost of lost human capital to the economy would be \$1 240 450. This cost is partially borne by the worker (lost income) and society (lost potential output and deadweight losses).

36. Literature reviews from work in similar studies (such as Leigh et. al. estimating the cost of occupational injuries and illnesses to the United States economy¹⁷) suggest that the human capital/lost wages approach is predominantly used to estimate lost productivity. This method was used by the Bureau of Transport Economics when estimating total road crash costs in Australia for 1996¹⁸.

17 Leigh J.P. et. al. (2000), *Costs of Occupational Injuries and Illnesses*.

18 Bureau of Transport Economics (2000), *Road Crash Costs in Australia*, BTE Report No. 102, Canberra.

Identifying the levels of severity of work-related incidents

37. The costs associated with work-related injury and disease will vary depending on the severity of the incident. Severity can range from minor incidents involving little or no absence from work to fatalities. In addition, whether an incident results in an injury or disease will also be a determining factor on the cost structure of the incident.

38. Generally, it is the case that the more severe the incident, the longer the time taken to recover and return to duties. Further, the more intensive the medical treatment required, the higher will be the costs associated with the incident. For the purposes of this analysis, five mutually exclusive categories of severity were created to define the level of severity (Table 1.2). These categories are based on definitions available from the National Dataset for Compensation-based Statistics, 2nd edition (NDS2), and are based on incident severity and duration of absence. With no reliable indicator of return to work status available in NDS2, we assume that capacity on return to work is based on duration of absence, with six months of absence being the point at which workers return with reduced capacity. For this reason, the classification system is not exhaustive of all possible cases and combinations of severity, duration of absence and return to work status. For example, it is possible to have incidents where a worker resumes partial duties with duration of less than six months absence, and similarly cases where a worker returns at full capacity after a period of more than six months. Return to work indicators available through the NDS 3rd edition¹⁹ are currently being examined to determine whether these data items could be used to further revise the severity classification system.

39. In general, work-related incidents that do not involve absences from work are thought to contribute negligibly to total costs. However, some incidents can have a considerable effect on productivity without involving a significant absence from work. Incidents such as these are difficult to measure through compensation based statistics, both in terms of the number of such incidents and their compensable cost structure. They are also difficult to identify through other sources such as the WRIS. For these reasons, incidents with less than one shift of time lost are excluded from the analysis.

40. The definitions of each category and the method of applying them to NDS data has been revised from the methodology used for the 2005–06 estimate, published in March 2009. The defined labels will be used in the summary tables that follow.

41. In particular an improved method has been used to distinguish permanent full incapacity from permanent partial incapacity to better identify workers who are unable to return to work. Data supplied by workers' compensation jurisdictions suggest that up to 10 per cent of the cases classified as permanent incapacity result in the worker being unable to return to work in any capacity.

42. Using this revised methodology, the additional permanent cases not considered to be no return to work cases are categorised using the partial incapacity category. This category assumes that the worker is able to return to the work force following a period of incapacity, at a reduced capacity when compared with pre-incident levels.

¹⁹ NDS3 data is currently available for a limited range of financial year updates and jurisdictions, but will become more prevalent in future updates of the NDS dataset.

43. The revisions applied to the methodology in this version have resulted in a significant reduction in the number of cases classified as permanent incapacity. This much better aligns with the original intent of the definition of the severity categories and the methodology used to calculate the unit cost for such permanent incapacity cases. In previous editions, the data distinguishing between permanent full incapacity and permanent partial incapacity was unavailable.

44. In addition to the categories summarised in Table 1.2, work-related incidents are also categorised according to their nature, as either an injury or a disease. Injuries are defined as work-related incidents resulting from a single traumatic event where the harm or hurt is immediately apparent. In contrast, diseases result from repeated or long-term exposure to an agent or agents, where the harm or hurt may not become apparent until after a latency period.

Table 1.2: Definition and labelling of severity categories

Category label	Severity Category	Definition
Short absence	Less than 5 days off work	A minor work-related injury or illness, involving less than 5 working days absence from normal duties, where the worker was able to resume full duties.
Long absence	Five days or more off work and return to work on full duties	A minor work-related injury or illness, involving 5 or more working days and less than 6 months off work, where the worker was able to resume full duties.
Partial incapacity	Five days or more off work and return to work on reduced duties or lower income	A work-related injury or illness which results in the worker returning to work more than 6 months after first leaving work. ^a
Full incapacity	Permanently incapacitated with no return to work	A work-related injury or disease, which results in the individual being permanently unable to return to work.
Fatality	Fatality	A work-related injury or disease, which results in death.

^a We assume cases in this category result in a return to work on reduced duties or income, with a resumption of normal duties. This category includes permanent incapacities for which a minimal duration of absence from work occurred and therefore the worker was able to return to work in some capacity, or for which a return to work in some capacity is possible.

Measurement of indirect cost items

Table 1.3 summarises the general estimation method and data sources that were used to determine average costs associated with each indirect cost item.

Table 1.3: Definitions and data sources for indirect cost items

Indirect Cost Item	Data Item	Sources
Loss of productivity (Value of Production)	Average weekly earnings by gender, state/territory and industry sector, average duration of absence by severity category.	Employee Earnings and Hours Survey (ABS Cat. No. 6306.0) NDS workers' compensation data.
Cost of overtime and over-employment	Average weekly earnings by gender, state/territory and industry sector, average duration of absence by severity category.	ABS Employee Earnings and Hours Survey (ABS Cat. No. 6306.0), NDS workers' compensation data.
Employer excess payments	Employer costs for the first 3.3 days of a claim and the first \$290 of medical costs.	Estimates based on the average excess provisions by each jurisdiction.
Loss of current income	Pre-injury earnings less compensation payments and average social welfare payments received.	ABS Employee Earnings and Hours Survey (ABS Cat. No. 6306.0), NDS workers' compensation data.
Recruitment, training and staff turnover costs ^a	The cost of replacing existing staff affected by work-related incidents (26 weeks of average wages), and training of new staff (2.5 weeks of average wages).	
Loss of future earnings (Human capital costs)	For cases involving full incapacity or fatality: loss of earnings from time of injury to retirement age (assumed to be 62 years), assuming a discount profile and productivity loss. For full incapacity, future earnings can also include average social welfare payments received (since these contribute to post-injury income).	ABS Employee Earnings and Hours Survey (ABS Cat. No. 6306.0), NDS workers' compensation data and Social Welfare Payments.
Medical and rehabilitation costs	Average medical and rehabilitation costs, with assumptions about the costs borne by employees not applying for compensation.	NDS workers' compensation data.
Investigation costs	Investigation costs: As a proxy for the costs to firms, investigation and inspection costs reported in jurisdictional annual reports are assumed to match the cost to employers for these functions.	CPM report data, workers' compensation jurisdictions annual reports.
Legal fines and penalties ^a	Average fine/legal cost associated with a prosecution following investigation.	CPM report data.
Legal costs and overheads ^a	Non-compensated legal costs associated with a typical work-related incident.	CPM report data.
Travel expenses	Payments made for travel expenses to workers' compensation jurisdictions by claimants (as a proxy, assuming that compensation is adequate to cover these expenses).	CPM report data, workers' compensation jurisdiction annual reports.
Social welfare payments	For severe incidents, average social welfare payment per recipient.	Department of Families, Housing Community Services and Indigenous Affairs Annual Report, 2009-10.
Rehabilitation	Average cost of rehabilitation per recipient, for cases involving lower duties, for full incapacity or fatality.	Department of Families, Housing Community Services and Indigenous Affairs Annual Report, 2009-10.
Loss of government revenue ^a	For full incapacity or fatality, taxation and other revenue foregone when workers are unable to work due to work-related incidents.	Average weekly earnings and estimates of the average or effective taxation rate for workers (source ATO web-site, ratio of income tax to total earnings).
Carers, modifications and aids	For full incapacity, the additional cost of care, house and other modifications and living aids.	DSS Survey of Disability Support Pensioners (2001).

^a Indirect costs items included in the estimate of total costs that were considered but not estimated in the 1995 Industry Commission report

Distribution of indirect cost items by severity category

45. Table 1.4 illustrates the indirect cost items that are associated with each severity category. Indirect cost items are estimated individually for each severity category before being aggregated into a total.

46. However, some items, particularly those sourced from workers' compensation jurisdictions' annual reports, are estimated across all applicable severity categories due to the lack of available data relating to distribution by severity. In these instances, the cost is distributed between the severity categories and an average cost is derived based on the number of work-related incidents in each category.

47. An example is the legal fines and penalties category where the data for total convictions and fines imposed by workers' compensation jurisdictions can be found from annual reports. During the 2005–06 financial year, 402 convictions for \$18 million in fines were recorded, leading to an average fine per conviction of \$45 000.²⁰ For this category, costs are assumed to be incurred for full incapacity and fatal cases only, with prosecution rates of 3 per cent for full incapacity cases and 50 per cent for fatal cases.

Table 1.4: Distribution of indirect cost items by severity category

Indirect Cost Item	Severity Category				
	Short absence	Long absence	Partial incapacity	Full incapacity	Fatality
Value of production	✓	✓	✓	✓	✓
Overtime and over-employment	✓	✓	✓	✓	✓
Employer excess costs	✓	✓	✓	✓	✓
Staff turnover and training/retraining costs			✓	✓	✓
Loss of future earnings (Human capital costs)			✓	✓	✓
Medical and rehabilitation costs	✓	✓	✓	✓	✓
Legal Costs ^a				✓	✓
Investigation costs ^a	✓	✓	✓	✓	✓
Travel costs	✓	✓	✓	✓	✓
Social welfare payments		✓	✓	✓	✓
Loss of government revenue		✓	✓	✓	✓
Carers, modifications and aids				✓	

^a These indirect cost items are estimated in aggregate across all applicable severity categories

Discounting future monetary values and the discount rate

48. Under the *lifetime cost* approach discussed previously, future costs of new cases for the reference year are modelled using present value calculations. The value of future payments or income streams are modified to an equivalent reference year monetary value by considering factors which affect the value of currency over time, such as saving and price/wage inflation. This information can be combined into a single value, called the *discount rate*, which summarises the likely changes in the value of money over time.

49. In this analysis, the discount rate is composed of:

- the opportunity cost of saving, modelled by average investment rates for common savings instruments. Opportunity cost is an economic concept defined as the advantage foregone as the result of the acceptance of an alternative. In this case the cost of spending or losing wages and other income is the cost of not saving that money into the future. The savings rate is modelled as the average interest rate over a selected period of a range of common savings instruments (term deposits and government bonds)
- price inflation, based on average consumer price index movements over a selected period, and
- a productivity factor, modelling the average increase in productivity. This is measured as wage increases above the prevailing wage inflation rate.

50. The productivity factor is only used in present value calculations involving real wages and models the implicit increase in wages for an individual and their experience and the resulting productivity increases over time.

51. Table A1.5 in Appendix 1 gives a summary of these parameters, while Appendix 3 gives a summary of the sensitivity of the cost estimate to changes in the values for the components of discount rate. For the results presented in Section 2 of the report, the rates used to form the discount rate were 6.0 per cent p.a. for savings and 2.6 per cent p.a. for inflation. This represents a discount rate of 3.4 per cent. When considering wage present value calculations, the productivity rate of 1.75 per cent p.a. was applied, leading to a modified discount rate of 1.65 per cent. Applying a range of possible rates (based on the historical period on which the rates cover, with longer periods giving higher average rates) to the calculation of total costs leads to a range of costs of between \$69 billion and \$84 billion for the 2008–09 reference year.

Determining the number of incidents in each severity category

52. The total number of work-related incidents (injury and disease) occurring in 2012–13 for Australia is estimated using an ‘incidence’ approach, in which only those incidents that occurred in the 2012–13 financial year are included in the total. The total number of incidents is estimated by combining compensation claim information from the NDS and data from the WRIS²¹. Cases are categorised by severity category, nature (injury or disease) and compensation status (compensated or non-compensated).

53. While the WRIS aligns to the 2013–14 financial year, the current estimate is developed for the 2012–13 reference year to better align with some of the other sources of data used in the estimate, particularly workers’ compensation and fatalities data. This reference year ensures that workers’ compensation claims in the NDS are sufficiently developed from the date of lodgement to provide accurate information on payments and time lost.

²¹ ABS Catalogue 6324.0, Work-related Injuries Survey, November 2014

54. NDS data provide the total number of accepted new compensation claims submitted to workers' compensation jurisdictions during the 2012–13 financial year. Accepted claims data can be categorised by severity, duration of absence, nature (injury/disease) and jurisdiction. However, since this data source contains only accepted workers' compensation claims, it does not cover all work-related incidents that occurred during the reference year. In particular, work-related incidents that result in a short duration of absence, or for which no compensation was paid, certain categories of working arrangements (self-employed) and some industries (such as agriculture and construction) will be significantly under-covered in the NDS data.

55. The WRIS is used as a base for total non-fatal non-compensated work-related incidents. It should be noted that the WRIS deals with injured workers and takes no account of whether a worker was injured on more than one occasion during the year. To the extent that workers suffer multiple periods of absence from work, the WRIS will underestimate the total number of work-related incidents.

56. Another aspect of the WRIS to be considered is self-reporting of the work-relatedness of the injury or illness. The more rigorous definition of work-relatedness used for the NDS and other such collections will not apply for estimates from the WRIS. It is not clear what effect this would have on the estimates of work-related incidents, however comparison of compensation based statistics with ABS Survey of Employment Arrangements and Superannuation (SEAS)²² data suggests that this distinction has less effect for longer term cases (such as full incapacity). Since the determination of work-relatedness in SEAS is conceptually similar to the method used for the WRIS, it is reasonable to assume that the same comparison will apply between the NDS and the WRIS. If this is the case, the effect on the level of total costs will be minor, since the largest contributors are long term injury or illness, where there are only minor differences between the surveys in terms of the definition of in-scope incidents.

57. For the 2012–13 financial year, the WRIS estimated that 531 800 workers (or 4.3 per cent of the working population) experienced a work-related incident. Of this total 348 600 workers did not receive compensation, either because no application was made or the application was rejected.

58. The WRIS also categorises incidents into days or shifts absent from work. Of the 348 600 workers experiencing a work-related injury that did not receive compensation, 185 400 lost part of a shift or experienced no time lost as a result of the injury. These incidents have been excluded from the analysis since they are likely to contribute only a negligible amount to total costs. While some incidents can reduce productivity without entailing any absence from work, their effect on productivity will be difficult to measure. For these reasons, cases with no absence from work and no lasting incapacity are excluded from the count of total cases.

59. Accepted workers' compensation claims from NDS were used as the basis for compensated cases, with the WRIS cases identified above (did not receive compensation with one or more days/shifts lost) forming the basis for the number of non-compensated cases. It is assumed that the distribution of incidents by severity category will be similar to the distribution for compensated (NDS) claims.

60. Additional estimates around disease morbidity have been included in this edition. Cases of work-related disease are known to be unreported in both workers'

22 ABS Catalogue 6361.0, Employment Arrangement and Superannuation, April to June 2007.

compensation data and through ABS surveys of the workforce. Disease classes such as neoplasm (cancers and tumours), asthma and other respiratory diseases and heart disease are common diseases resulting from workplace exposure. Table 1.5 shows the estimated number of disease morbidities in each of these groups. The estimates are based on a number of studies of population attributable fractions for workplace exposure. The additional disease morbidities estimated in this process are included in the non-compensated disease category (Table 1.6).

Table 1.5: Estimates of disease morbidity due to work-related exposures, 2012–13^a

Disease	Morbidity estimate
Neoplasm ^b	5 000
Asthma ^c	3 000
Respiratory disease ^c	21 000
Heart disease ^{de}	25 000
Total	54 000

^a Morbidity estimates are reported to the nearest 1000 cases

^b Fritschi and Driscoll, *Cancer due to occupation in Australia*, Aust NZ J Public Health 2006; Vol 30.

^c Australian Safety and Compensation Council, *Occupational Respiratory Diseases in Australia*, April 2006.

^d Australian Institute of Health and Welfare, *Cardiovascular Disease: Australian facts 2011*, March 2011.

^e Australian Safety and Compensation Council, *Work-related cardio-vascular disease Australia*, April 2006.

61. Applying these assumptions results in an estimate of 529 800 workers injured during 2012–13. Of these, 264 900 cases were not compensated and 264 900 received compensation. Table 1.6 summarises the distribution of total injured and ill workers from the combination of NDS data and the WRIS, by nature and duration. The summary applied to non-fatal cases only. The estimation of fatalities is discussed below.

Table 1.6: Work-related injuries by duration of absence and nature, 2012–13^a

	Time period	No compensation	Compensation	Total
Injuries	0–4 days	107 200	122 500	229 700
	5+ days	58 500	86 300	144 800
	Total	165 700	208 800	374 500
Disease	0–4 days	20 800	23 800	44 600
	5+ days	78 400	32 200	110 600
	Total	99 200	56 000	155 200
All incidents	0–4 days	128 000	146 300	274 300
	5+ days	136 900	118 600	255 500
	Total	264 900	264 900	529 800

Source: NDS data and ABS 6324.0, Work-related Injuries Survey, November 2014

^a Totals are rounded to the nearest 100

62. The estimate of the number of cases derived from the combination of the WRIS and the NDS increased by 56 per cent between the 2000–01 estimate (350 200) and the 2008–09 estimate (544 700). The estimate fell by 3% between 2008-09 and 2012-13. Over the same period (2000-01 to 2012-13), the number of workers covered by workers' compensation grew by 29 per cent.

63. Estimates of fatal incidents are sourced from a separate project estimating the number of work-related fatalities, for injury and disease. Estimates of injury fatalities for 2008–09 are sourced from Safe Work Australia data publications²³. Disease fatalities estimates are assumed to be a similar level to the previous study (2 210 total work-related disease fatalities). These disease fatality estimates are considered to be a conservative estimate. Studies using attributable fractions²⁴ derived from international research and applied to Australian cause of death data have estimated that there are between 2 300 and 7 000 deaths annually due to workplace exposure in Australia. These estimates replace the NDS totals for fatal claims, which are known to be an underestimate, particularly for disease claims. Table 1.7 summarises the distribution of work-related incidents by nature and severity category.

Table 1.7: Number and distribution of work-related incidents by severity category, 2012–13

			Short absence	Long absence	Partial incapacity	Full incapacity	Fatality	All Incidents
Injury	Compensated	Per cent	59	34	7	0	0	100
		Number	122 500	71 500	14 200	400	197	208 800
	Not compensated	Per cent	65	29	6	0	0	100
		Number	107 200	48 400	9 600	300	203	165 700
Disease	Compensated	Per cent	42	38	19	0	0	100
		Number	23 800	21 300	10 800	100	40	56 000
	Not compensated	Per cent	21	51	26	0	2	100
		Number	20 800	50 400	25 600	200	2 170	99 200
All cases	Compensated	Per cent	55	35	9	0	0	100
		Number	146 300	92 800	25 000	600	213	264 900
	Not compensated	Per cent	48	37	13	0	1	100
		Number	128 000	98 800	35 200	500	2 373	264 900
	All cases	Per cent	52	36	11	0	0	100
		Number	274 300	191 600	60 200	1 000	2 610	529 700

Sources: National Dataset for compensation based statistics (NDS) and ABS Work-related injuries Survey (WRIS)

* Percentage figures are rounded to the nearest 1%. Some figures that are less than 1% will appear as 0% in this table. For this reason, sub-totals may not match exactly with the relevant total.

64. The average duration of absence for each severity category is determined using NDS data. This data is presented in Table 1.8 below. The analysis is based on the

23 Work-related Traumatic Injury Fatalities, Australia 2013. Safe Work Australia, July 2014.

24 Attributable fraction methodology involves using available information and exposure to disease causing substances or situations in different occupations and industries to develop a proportion of particular diseases that could be caused by workplace exposure.

assumption that the characteristics of duration of absence are similar between compensated and non-compensated claims. Average duration for each group was defined as total time lost divided by the total number of compensated claims in each category.

65. These are conservative estimates of time lost, since they are based on compensation statistics that measure duration of absence only while compensation payments are occurring. However, the opposite may be the case for non-compensated cases, where duration of absence is potentially lower than compensated cases of a similar nature. Given the balance between compensated and non-compensated cases, these estimates are still likely to be conservative estimates of duration of absence before return to work.

66. The duration of absence figures in Table 1.8 are used to model the cost to the worker, in terms of lost wages of individuals in the human capital model. In the calculation of production disturbance costs, a maximum of four weeks of lost time is used to estimate employer costs, covering the period between the incident and the time when an injured or ill worker returns to work or is replaced.

Table 1.8: Average duration of absence (in weeks) by nature and severity category, Australia, 2012–13

	Short absence	Long absence	Partial incapacity	Full incapacity ^a	Fatality ^b
Injury	0.2	6.4	45.0	39.7	2.6
Disease	0.2	8.1	38.0	48.4	68.9

Source: NDS

a Average time lost for full capacity cases is used to model the time in which the incident affects the employer. Since the worker is assumed to be permanently unable to return to work, the effects of the incident are assumed to incur costs to the worker and the community from the time of the incident.

b Average time lost for disease fatalities is estimated using a combination of duration of absence and the time period between occurrence and submitting a claim. This assumes for disease fatalities that a worker will experience a gradual onset of symptoms before a workers' compensation claim is filed, during which time their work performance will be affected.

Determining the average costs of a work-related incident

67. The average cost of a work-related incident was estimated by calculating the average cost associated with each relevant indirect cost item. These costs are then aggregated over each cost item to derive an overall estimate. Appendix 1 gives a detailed explanation of the estimation procedure applied to each item to derive a total average cost estimate.

68. Table 1.9 gives a summary of the average cost associated with each severity category, as well as the breakdown of the average cost to each economic agent. Typical unit costs for injury and disease incidents (averaged across severity categories) are estimated at \$75 400 and \$223 600 respectively.

Table 1.9: Average costs (\$ per incident) for work-related incidents, Australia, 2012–13^a

		Short absence	Long absence	Partial incapacity	Full incapacity	Fatality	Average
Employer	Injury	700	8 800	16 400	13 400	26 600	4 400
	Disease	700	11 200	12 100	31 900	72 400	9 600
Worker	Injury	300	4 500	696 900	2 154 200	1 728 700	52 000
	Disease	400	4 200	681 800	1 912 000	1 185 500	189 200
Community	Injury	3 200	22 800	95 400	1 578 800	585 100	19 100
	Disease	5 200	15 200	44 700	956 000	212 700	24 800
All	Injury	4 200	36 200	808 600	3 746 400	2 340 400	75 400
	Disease	6 300	30 600	738 700	2 899 900	1 470 600	223 600
All cases		4 500	34 100	766 300	3 496 100	1 597 100	116 600

Source: ASCC Estimation of indirect cost items (see Appendix 1 for more detail)

^a Unit costs are rounded to the nearest \$100.

Calculation and distribution of total costs

69. The total cost of work-related injury and disease is calculated by combining the information relating to the number of work-related incidents (Table 1.7) and the average cost of an incident by severity category (Table 1.9). Section 2 presents a summary of the application of this methodology.

SECTION 2. RESULTS

70. This section summarises the results obtained by applying the methodology from Section 1. In this analysis, unit (average) cost and total cost breakdowns are presented by a variety of factors, including location and industry of workplace, occupation, economic agent and the type and severity of the incident.

71. The cost of work-related injury and disease to workers, their employers and the community for the 2012–12 financial year data is estimated to be **\$61.8 billion**. Injuries account for \$28 billion of the total economic cost (45 per cent). The majority of cost is borne by individuals and society (95 per cent). Table 2.1 summarises the distribution of the total cost of work-related injury and disease by severity category, nature and the economic agent bearing the cost. These figures and the distributions presented in the following tables in this section are based on an ‘ex-post’ approach to assigning costs, where workers’ compensation payments redistributed to workers are considered as a cost to society.

72. Under the ‘ex-ante’ approach, workers’ compensation premiums paid by employers (estimated to be \$8.4 billion in the 2012–13 financial year) are redistributed as a cost to employers rather than as payments transferred from society to injured workers. Under this assumption, the economic cost to employers would rise to \$11.5 billion (19 per cent) and the community burden would be reduced to \$2.4 billion (4 per cent). These totals are shown in Table 2.1. Because of the nature of the compensation based data on which total cases are based, it is not possible to provide the distribution of ‘ex-ante’ costs by the characteristics presented in Table 2.1 (severity type and nature).

Table 2.1: Total costs of work-related injury and illness (\$ million), Australia, 2012–13

		Short absence	Long absence	Partial incapacity	Full incapacity	Fatality	Overall cost (ex-post)	Overall cost (ex-ante)
Employer	Injury	200	1 100	400	0*	0*	1 600	
	Disease	0*	800	400	0*	200	1 400	
	Total						3 100	11 500
Worker	Injury	100	500	16 600	1 600	700	19 500	
	Disease	0*	300	24 800	600	2 600	28 400	
	Total						47 900	47 900
Community	Injury	700	2 700	2 300	1 200	200	7 100	
	Disease	200	1 100	1 600	300	500	3 700	
	Total						10 800	2 400
All	Injury	1 000	4 300	19 300	2 800	900	28 200	
	Disease	200	2 200	26 900	900	3 300	33 600	
	Total	1 200	6 500	46 200	3 700	4 100	61 800	61 800

* Units are rounded to the nearest \$100 million. Some sub-totals may not add due to rounding below \$50 million. Sub-totals which are less than \$50 million will appear as zero in this table.

73. Figure 2.1 presents the distribution of total economic costs by economic agent and severity category. The distribution is based on the ‘ex-post’ approach to assigning costs, where workers’ compensation payments redistributed to claimants are considered to be a cost to society.

Figure 2.1: Distribution of total costs (\$b) by economic agent and severity, Australia, 2012–13



74. The distribution of total economic costs of work-related injury and illness by the economic agent bearing the cost and the nature of the incident is presented in Table 2.2. The table also illustrates the unit cost of a typical incident in each of these categories.

Table 2.2: Total cost (\$ billion) and average cost (\$ per work-related incident) for work-related injury and illness, Australia, 2012–13

	Injury		Disease		Total	
	Total Cost (\$ billion)	Unit cost (\$ per incident)	Total Cost (\$ billion)	Unit cost (\$ per incident)	Total Cost (\$ billion)	Unit cost (\$ per incident)
Employer	1.6	4 350	1.4	9 280	3.1	5 800
Worker	19.5	51 960	28.4	182 900	47.8	90 300
Community	7.1	19 070	3.7	23 970	10.9	20 500
Total	28.2	75 380	33.5	216 150	61.8	116 600

75. Based on these estimates, the average cost to the individual is considerably higher for work-related diseases (\$182 900) than for an injury (\$51 960). In contrast, the cost to the community is not as dependent on the type of incident (\$19 070 per incident for injury compared with \$23 970 per incident for disease).

76. The average unit cost for a work-related incident borne by all economic agents is estimated at \$116 600. Unit costs for diseases are estimated to be higher than unit costs for injuries (\$216 159 compared with \$75 380).

77. Table 2.3a shows the distribution of estimated total costs and unit costs by location (Australian state or territory) of operation of the workplace. The differences in treatment of full incapacity claims between jurisdictions are likely to have a significant effect on the distribution of total costs. While efforts have been made to ensure comparability between jurisdictions, the distribution of total costs by location should be considered as

indicative only. Based on this distribution, New South Wales bears 31 per cent of the total cost from 32 per cent of total Australian cases.

78. The relative unit cost in each jurisdiction is also reflected in the total economic cost as a proportion of gross state product (GSP). The cost of injury and illness as a percentage of GSP is highest for Tasmania and the Australian Capital Territory (7.7 per cent and 7.2 per cent), while the highest unit cost occurs for the Northern Territory (\$187 500 per case). Appendix 2 presents a more detailed distribution of total costs by jurisdiction.

Table 2.3a: Cost (\$ million) of work-related injury and illness, by location of workplace, 2012–13^a

State/territory ^a	Total Cost (\$ million)			Economic cost % GSP/ GDP ^b	Distribution (%)			Unit Cost \$/case
	Injury	Disease	Total		Costs	Cases	Workforce	
Tasmania	900	900	1 800	7.6%	2.9%	2.9%	2.0%	117 700
South Australia	2 100	2 900	5 000	5.3%	8.1%	8.6%	7.0%	110 300
Australian Capital Territory	900	900	1 800	5.3%	3.0%	2.5%	1.8%	137 200
Northern Territory	600	400	1 000	4.9%	1.6%	1.0%	1.2%	183 400
Victoria	5 100	9 500	14 600	4.4%	23.5%	21.8%	24.9%	126 500
Queensland	5 800	6 500	12 300	4.3%	19.9%	19.9%	20.2%	116 700
New South Wales	8 700	8 600	17 300	3.7%	28.1%	30.8%	31.3%	106 000
Western Australia	4 100	3 800	7 900	3.4%	13.0%	12.5%	11.6%	119 000
Australia	28 200	33 500	61 700	4.1%	100.0%	100.0%	100.0%	116 400

a Units are rounded to the nearest \$100 million

b Source: ABS State Accounts (Catalogue No. 5220.0), November 2010. Compared with 2009–10 estimates of reference year chained volume measures of GDP and GSP.

c State or Territory is determined by the postcode of the location at which the incidence occurred.

79. Table 2.3b presents the distribution of total costs and estimated unit costs by the industry of the workplace. These figures are based on differences in the number and distribution of claims and average weekly earnings between each industry division. These results suggest that the distribution of costs between industry divisions is similar to that of the number of incidents. The most notable exceptions to this are the Retail Trade industry, which bears 6 per cent of the cost from 8 per cent of the total number of incidents (with a unit cost of \$85 600 per case), and Accommodation & food Services which bears only 5 per cent of the total cost from 7 per cent of the total number of incidents (a low unit cost of \$88 000 per case). The Manufacturing, Construction and Health Care & Social Assistance industries account for nearly 40 per cent of total costs. The Information Media & Telecommunications industry had the highest unit cost of \$239 000 per case, however only 1 per cent of the total number of cases for Australia in 2012–13 occurred in this industry division.

Table 2.3b: Cost (\$ million) of work-related injury and illness, by industry of workplace, 2012–13^a

Industry division	Total Cost (\$ million)			Distribution (%)			Unit Cost
	Injury	Disease	Total	Costs	Cases	Workforce	\$/case
Health Care and Social Assistance	3 520	4 690	8 210	13	14	12	110 550
Manufacturing	3 470	4 490	7 960	13	14	8	103 950
Construction	2 860	2 980	5 840	9	9	9	117 180
Public Administration and Safety	2 150	3 010	5 160	8	8	6	122 790
Transport, Postal and Warehousing	2 250	2 830	5 080	8	8	5	118 150
Education and Training	1 640	2 230	3 870	6	6	8	119 250
Retail Trade	1 700	1 960	3 660	6	8	11	84 700
Accommodation and Food Services	1 450	1 690	3 140	5	7	7	89 120
Wholesale Trade	1 240	1 320	2 560	4	4	4	119 610
Mining	1 280	1 160	2 440	4	2	2	197 290
Agriculture, Forestry and Fishing	1 190	1 160	2 350	4	3	3	133 170
Professional, Scientific and Technical Services	930	1 410	2 340	4	3	8	163 120
Other Services	930	970	1 900	3	4	4	101 430
Administrative and Support Services	1 020	780	1 800	3	3	3	111 640
Electricity, Gas, Water and Waste Services	670	860	1 530	2	2	1	162 780
Financial and Insurance Services	490	720	1 210	2	1	4	194 810
Arts and Recreation Services	590	470	1 060	2	2	2	132 780
Information Media and Telecommunications	390	470	860	1	1	2	228 350
Rental, Hiring and Real Estate Services	480	350	830	1	1	2	174 210
Australia	28 250	33 550	61 800	100	100	100	116 750

a Units are rounded to the nearest \$100 million

80. Table 2.3c shows the distribution of total costs and unit costs by age²⁵ and sex for the 2012–13 financial year. These costs are calculated by combining the number of cases, average total earnings and the average age at incident for each of the specified age groups.

81. The calculation of human capital costs is based on a valuation of potential production forgone due to a work-related injury or disease. For this reason, the unit cost for younger employees will be significantly higher than for older employees due to the increased lost potential, calculated from the time of the incident to retirement age. This is reflected in Table 2.3c, which shows that the unit cost of a work-related injury or disease is significantly higher for the 15 to 24 and 25 to 34 years age group and decreases with increasing age.

82. The unit cost of a work-related injury or illness is significantly higher for males than for females. Incidents involving males account for nearly two thirds of the total economic cost while comprising just over 60 per cent of the total number of incidents.

²⁵ Age is defined as the age at the time of the incident or exposure leading to the injury or illness.

Table 2.3c: Cost (\$ million) of work-related injury and illness, by sex and age group, 2012–13^a

Age group	Total Cost (\$ million)			Distribution (%)		Unit Cost
	Injury	Disease	Total	Costs	Cases	\$/case
15 to 24 years	5 800	6 900	12 700	21	17	143 700
25 to 34 years	7 500	9 600	17 100	28	21	156 500
35 to 44 years	7 400	9 500	16 900	27	23	139 100
45 to 54 years	5 400	5 900	11 300	18	23	91 400
55 years and over	2 100	1 600	3 800	6	16	43 800
Sex						
Female	9 300	12 500	21 900	35.4	39.8	103 900
Male	18 900	21 000	39 900	64.6	60.2	125 000
Australia	28 200	33 500	61 800	100	100	116 700

a Units are rounded to the nearest \$100 million

83. Table 2.3d shows the distribution of economic costs by occupation. Managers and Professional have the highest unit cost (\$155 200 and \$143 400 respectively).

84. Workers in occupations covering Technicians & Trades Workers, Machinery Operators & Drivers and Labourers, while comprising 31% of the workforce, contribute 58% of total cases and 57% of total costs. As shown in Table 2.3d, the incidence rate for work-related incidents is very dependent on the occupation group. The three occupation groups mentioned above have a rate of incidence of 86 cases per 1000 workers, considerably higher than the rate of 46.5 cases per 1000 workers over all occupation groups.

Table 2.3d: Cost (\$ million) of work-related injury and illness, by occupation group, 2012–13^a

Occupation group	Total Cost (\$million)			Distribution (%)			Incidence	Unit Cost
	Injury	Disease	Total	Costs	Cases	Workforce	/1000 workers	\$/case
Managers	1 600	2 100	3 700	6	5	13	16.6	155 200
Professionals	3 300	4 600	7 900	13	10	22	21.8	143 400
Technicians and Trades Workers	5 800	6 900	12 700	21	19	15	62.1	123 000
Community and Personal Service Workers	3 900	4 600	8 500	14	15	10	71.6	106 800
Clerical and Administrative Workers	1 500	2 000	3 500	6	6	15	18.6	112 700
Sales Workers	1 400	1 700	3 100	5	6	9	30.1	96 600
Machinery Operators and Drivers	4 600	5 300	9 900	16	15	7	102.4	126 400
Labourers	5 900	6 500	12 400	20	23	10	108.2	100 000
Australia	28 000	33 700	61 700	100	100	100	46.5	116 500

a Units are rounded to the nearest \$100 million

85. Table 2.3e shows the distribution of economic costs by cause of injury or illness (mechanism). Over one third of the total number of cases and total economic cost are associated with body stressing or manual handling cases. Mechanisms which are more associated with disease cases, such as sound and pressure, biological factors and mental stress have a higher unit cost than those largely associated with injuries (such as falls and trips and body stressing). While mental stress cases comprise two per cent of the total number of cases, they contribute five per cent of the total economic cost.

Table 2.3e: Cost (\$ million) of work-related injury and illness, by cause of injury or illness, 2012–13^a

Mechanism	Total Cost (\$ million)			Distribution (%)		Unit Cost
	Injury	Disease	Total	Costs	Cases	\$/case
Fall, trips and slips of a person	6 640	4 910	11 550	19	21	104 370
Hitting objects with part of the body	2 860	3 090	5 950	10	11	103 850
Being hit by objects	4 530	2 970	7 500	12	15	95 550
Sound and pressure	80	1 550	1 630	3	1	243 460
Body stressing	10 390	14 370	24 760	40	40	115 780
Heat, radiation and electricity	830	610	1 440	2	2	130 320
Chemicals and other substances	660	1 390	2 050	3	3	148 090
Biological factors	110	460	570	1	0	348 370
Mental stress	20	3 080	3 100	5	2	292 770
Other and unspecified mechanisms	2 120	1 100	3 220	5	5	125 100
Australia	28 240	33 530	61 770	100	100	116 580

a Units are rounded to the nearest \$100 million

86. Table 2.3f shows the distribution of economic costs by the type of injury or disease (nature). Musculoskeletal Disorders account for 17 per cent of all cases and 11 per cent of total costs. Wounds and Joint & ligament injuries together account for 57 per cent of all cases, but only 28 per cent of costs.

Table 2.3f: Cost (\$ million) of work-related injury and illness, by type of injury or illness, 2012–13^a

Nature of injury or disease	Total Cost (\$ million)			Distribution (%)		Unit Cost
	Injury	Disease	Total	Costs	Cases	\$/case
Intracranial Injuries	620	-	620	1%	1%	231 120
Fractures	3 110	-	3 110	4%	7%	90 150
Wounds, lacerations and amputations	5 940	-	5 940	8%	17%	65 400
Burn	990	-	990	1%	2%	108 320
Injury To Nerves And Spinal Cord	480	-	480	1%	0%	663 530
Joint, ligament and muscle Injury	14 580	-	14 580	21%	40%	68 600
Other Injuries	1 940	-	1 940	3%	4%	87 360
Musculoskeletal Disorders	-	9 530	9 530	17%	11%	165 920
Mental Disorders	-	3 870	3 870	7%	4%	201 690
Digestive System Diseases	-	1 640	1 640	3%	1%	225 390
Skin And Tissue Diseases	-	620	620	1%	0%	303 560
Nervous System Diseases	-	2 500	2 500	4%	2%	200 980
Respiratory System Diseases	-	6 350	6 350	11%	5%	254 600
Circulatory System Diseases	-	6 520	6 520	12%	5%	256 710
Infectious And Parasitic Diseases	-	460	460	1%	0%	582 280
Neoplasms (Cancer)	-	1 680	1 680	3%	1%	311 810
Other Diseases	-	380	380	1%	0%	1189 730
Other Claims	570	-	570	1%	0%	295 580
Australia	28 230	33 550	61 780	100.0%	100.0%	116 620

a Units are rounded to the nearest \$100 million

87. Table 2.4 shows the distribution of total and unit costs by severity category, differentiating between injuries and diseases. The table illustrates the significant differences in total and unit costs across severity categories.

Table 2.4: Unit costs (\$ per incident) and total costs (\$ million) of work-related injury and illness by severity and nature, 2012–13

		Short absence	Long absence	Partial incapacity	Full incapacity	Fatality	Total
Injury	Unit cost (\$)	4 180	36 200	808 820	4000 000	2200 000	75 380
	Total cost (\$m)	960	4 340	19 250	2 800	880	28 230
Disease	Unit cost (\$)	6 280	30 540	739 290	3033 330	1497 700	216 150
	Total cost (\$m)	280	2 190	26 910	910	3 250	33 540
All claims	Unit cost (\$)	4 520	34 080	766 780	3710 000	1607 000	116 620
	Total cost (\$m)	1 240	6 530	46 160	3 710	4 130	61 770

88. The share of costs borne by the individual and community rises sharply with severity. While employers and the community bear most of the cost of short-term injuries and diseases, the burden shifts to workers as the level of severity increases (Table 2.5). The majority of economic costs associated with full incapacity are borne by the community, through social welfare and other support schemes, and loss of potential (human capital).

Table 2.5: Distribution (%) of total cost of work-related injury and illness by severity category, 2012–13

	Short absence	Long absence	Partial incapacity	Full incapacity	Fatality	Overall
Employers (%)	15	28	2	1	4	5
Workers (%)	7	13	90	60	79	77
Community (%)	77	59	8	40	17	18
Total (%)	100	100	100	100	100	100

89. The total cost of work-related injury and disease are spread across employers, workers and the community. It is estimated that:

- employers bear 5 per cent of the total cost – this includes loss of productivity from absent workers, recruitment and retraining costs and fines and penalties from breaches of work health and safety regulations
- injured workers bear 77 per cent of the costs – costs include loss of current and future income and non-compensated medical expenses, and
- the community bears 18 per cent of the total cost – this includes social welfare payments, medical and health scheme costs and loss of potential output and revenue.

90. The burden of total cost borne by the economic agents has changed considerably from the 2000–01 estimate. The trend over the four iterations of this report have been for an increasing proportion of costs to be borne by workers and a decreasing proportion of costs borne by the community. In part, this is due to the growth in average weekly earnings. Between 2000–01 and 2012–13, average weekly earnings grew by 75%.

91. Human capital costs for workers are calculated as a residual between total human capital loss and deadweight loss to society from taxation and welfare redistributions. Since the former is a measure of lost future productivity, it is largely driven by the prevailing wage rate. However, transfer costs are related to unit health and welfare costs which are not directly related to wages. For this reason, the residual identity (human capital costs for workers) has shown significant increases (from 38 per cent of the total cost in the 2000–01 estimate to 74 per cent for the current estimate). This change has markedly shifted the distribution of costs between workers and the community since the original estimate was produced.

92. These figures are based on an ‘ex-post’ treatment of workers’ compensation premiums paid by employers (estimated to be \$8.4 billion in the 2012–13 financial year), where the redistribution of premiums paid to injured workers is treated as a transfer cost to society. Under an ‘ex-ante’ treatment of costs, the \$8.4 billion cost is transferred to employers, increasing the burden borne by employers to 19 per cent reducing the burden on the community to 4 per cent.

93. The actual cost borne by workers rises significantly with severity, with workers who are permanently incapacitated estimated to contribute, on average, over one million dollars in economic costs (including estimates for future income lost - see Table 1.9). The most severe incidents account for the bulk of total costs. Work-related injury and disease cases resulting in partial or full incapacity or fatality account for 87 per cent of total costs from only 12 per cent total cases. Table 2.6 shows the distribution of claims and total costs by severity category and nature of incident.

Table 2.6: Distribution of costs and incidents (% of total costs and total incidents) of work-related injury and disease by severity, 2012–13

		Short absence	Long absence	Partial incapacity	Full incapacity	Fatality	All Incidents
Injury	Distribution of incidents (%)	61	32	6	0*	0*	100
	Distribution of total costs (%)	3	15	68	10	3	100
Disease	Distribution of incidents (%)	29	46	23	0*	1	100
	Distribution of total costs (%)	1	7	80	3	10	100
All claims	Distribution of incidents (%)	52	36	11	0*	0*	100
	Distribution of total costs (%)	2	11	75	6	7	100

* Units are rounded to the nearest 1%. Cells accounting for less than 1% of the total cost will appear as zero in this table.

94. Generally, the more severe the incident, the higher the unit and total cost associated with that incident. Employers tend to bear most of the burden for minor and short-term incidents while the workers and the community bear a majority of the burden for more severe and longer-term incidents, such as full incapacity or fatality.

APPENDIX 1. INPUTS DERIVED IN THE PROCESS OF ESTIMATING TYPICAL COSTS

This appendix presents a detailed summary of the process and data sources used in estimating typical costs for a work-related incident in each severity category. A summary of the estimation of costs, and the key assumptions required, for each category of work-related incident is presented in Tables A1.1, A1.2 and A1.3 for cost items relevant to employers, workers and the community.

Table A1.1: Definitions, methods and assumptions for deriving key inputs, employer cost items

Cost Category (Conceptual Group)	Definition	Estimation
Cost of overtime and over-employment (PDC)	Proportion of overtime totally related to work-related injuries and wage of workers that would not be required if there were no work-related injuries.	Average weekly earnings x duration of absence in weeks x 0.4.
Employer excess payments (PDC)	Portion of the costs of a claim required to be paid by the employer before workers' compensation provisions begin.	Average cost per day per claim (estimated from NDS data) multiplied by 3.3 days. ^b
Staff turnover costs (PDC)	The costs to the employer associated with hiring new employees to replace injured or absent workers. This includes advertising costs and the costs associated with time spent in the recruitment process.	Turnover and recruitment costs are estimated to be equal in value to 26 weeks at average earnings less the amount simply 'brought forward' by work-related incidents.
Staff training and retraining costs (PDC)	The costs to the employer associated with training existing staff and retraining new staff. This could arise both from legislative requirements as a result of work-related incidents or simply the need to train staff with new skills as a result of increased responsibility or changed duties.	Average weekly earnings x 2.5. ^c
Medical threshold payments (MEDC)	Portion of workers' medical expenses to be met by the employer as part of employer excess provisions.	Average threshold medical payments, \$500 in payments.
Legal fines and penalties (ADMINC)	Costs associated with successful prosecutions associated with proceedings initiated by workers' compensation authorities as a result of serious work-related incidents.	Average fine per conviction x number of convictions / total number of incidents. ^d
Investigation costs (ADMINC)	Costs associated with conducting an investigation into an incident and the administrative cost of collecting and reporting information on work-related incidents.	Workers' compensation expenditures relating to conducting investigations.

a For claims of longer duration or severity (such as full incapacity and fatality), the injured worker is assumed to be replaced after 8 weeks. The distribution of labour on-costs is based on data from the ABS Major Labour Costs survey, and includes costs such as payroll tax and superannuation.

b Employer excess provisions differ between jurisdictions, both in terms of nature and period. The most common form of employer excess is 4 days, where the employer is liable for the costs associated with the first four days of a claim. However, some jurisdictions require no employer excess provisions. The weighted average of the excess period over each jurisdiction is 3.3 days. For severity category 1 the actual days lost are used in this calculation. For other categories, 3.3 days is used to proxy employer excess payments.

c Training and re-training are assumed to occupy approximately 2 ½ weeks, covering both the time of the worker and also any training responsibilities of existing staff.

d Based on CPM estimates, the average fine per conviction is \$100 000 and the prosecution rate is assumed to be 3% of incidents for full incapacity and 50% of incidents for fatalities.

Table A1.2: Definitions, methods and assumptions for deriving key inputs, worker cost items

Cost Category (Conceptual Group)	Definition	Estimation
Loss of current income (PDC)	Difference between pre-injury earnings and earnings following a work-related incident in the time following the incident to return to duties earnings less workers' compensation and social welfare payments.	Residual item, Total PDC less employer and society share of PDC.
Loss of future earnings (HKC)	Where the work-related injury or disease prevents natural career advancement and results in the worker being employed in a lower paid job, suffers a full incapacity or premature death.	Difference between expected future earnings in the absence of a work-related injury or disease and expected future income following the incident. ^a
Medical and rehabilitation costs (MEDC)	Expenditure on medical treatment not compensated via workers' compensation payments or government assistance.	The difference between medical costs incurred less medical payments covered by workers' compensation less government rebates. ^b
Travel expenses (ADMINC)	Expenses for travel to doctors, rehabilitation centres, solicitors etc., less costs made in form of direct payments already included in the direct costs estimate.	Estimated from workers' compensation payments made for travel expenses (6% of NDS non-compensation payments).
Legal costs (ADMINC)	Legal costs and expenses, less costs made in form of direct payments already included in the direct costs estimate.	Difference between the average legal costs and overheads for a dispute and the amount received in compensation for legal costs. ^c
Funeral costs (ADMINC)	Real costs of bringing forward a funeral.	Average funeral costs are estimated at \$4 000. Brought forward funeral costs are the discounted present value of a funeral at the time of life expectancy compared with the age at the time of the incident.
Carers (OTHERC)	For full incapacity cases only, the present value of future costs for carers.	Estimated applicable Disability Support Pension payments of \$2 056 per annum, discounted to present value over the period between the incident and reduced life expectancy.
Aids and modifications (OTHERC)	For full incapacity cases only, the present value of future costs for aids and modifications.	Estimated applicable Disability Support Pension payments of \$646 per annum, discounted to present value over the period between the incident and reduced life expectancy.

^a Workers are assumed to increase productivity (through experience and job knowledge) at the rate of 1.75% per annum. This figure is used in conjunction with discount and inflation rates to determine the present value of future income streams.

^b Medicare covered services that are bulk-billed are assumed to incur no cost to the individual. Workers are assumed to bear 15% of the total cost of the services when that service is not bulk-billed and covered by Medicare. On average, 47% of total costs result from Medicare covered services, with the remaining 53% of costs available to be covered by private health insurance. Private health insurance covers 44% of cases, with the worker paying the gap payments of 5% on these costs. The costs of the remaining services are fully borne by the individual.

^c Average legal costs and overheads per dispute are estimated to be \$12 500 per dispute. According to CPM data, disputes occur at a rate of 1 dispute per 8 claims. Average compensation for legal costs varies according to the severity of the incident, but comprises 62% of non-compensation payments.

Table A1.3: Definitions, methods and assumptions for deriving key inputs, community cost items

Cost Category (Conceptual Group)	Definition	Estimation
Lost revenue (PDC/HKC)	The potential revenue lost when a worker suffers reduced earning capacity due to severe work-related incidents.	The taxation value of the present value of all future earnings over the period in which the individual is unable to work or that is lost through premature fatality. ^a
Social welfare payments (PDC/HKC)	Sickness and social welfare payments borne by the government for people with disabilities or the unemployed.	Average cost per recipient of social welfare programs. ^b
Health and medical costs (MEDC)	Costs borne by the government through the provision of subsidised hospital, medical and pharmaceutical services.	Total Medicare costs that are not borne by the worker.
Rehabilitation (MEDC)	Expenditure on vocational education and training, special treatments etc.	Average cost of rehabilitation service (per recipient) reported by the Commonwealth Rehabilitation Service (CRS). ^c
Inspection and investigation costs (ADMINC)	Costs incurred by the agency responsible for conducting inspections and investigations.	Average cost per inspection reported by workers' compensation jurisdictions.
Travel concessions for full incapacity (ADMINC)	Travel concessions and other allowances offered in cases where return to work is not possible.	Expenditure on travel costs by workers' compensation jurisdictions as a proxy for travel concessions. ^d
Transfer costs (TRANC)	Deadweight costs of welfare payments and tax losses.	

a Based on average weekly earnings over the period of lost earnings, with an average taxation rate of 40%. Savings, inflation and productivity rates are also applied in determining the present value of future income streams. This total is split into short and long term costs. Short terms costs are incurred in the period between the incident and return to work, while long term costs are incurred in the period following nominal return to work or replacement and retirement or to reduced life expectancy.

b Workers who suffer severe incidents are assumed to rely on the Disability Support Pension (average cost per case is \$111 223 p.a.) following a period of compensation (for compensated incidents).

c Workers who suffer a full incapacity are assumed to rely on the CRS (average cost per case is \$4 000 p.a.) following the period of compensation (zero for non-compensated incidents).

d The community is assumed to match compensation payments for travel costs 1–1 with the individual, in effect assuming a 50 per cent travel concession for severely incapacitated workers.

Tables A1.4 and A1.5 summarise some relevant information and estimates as required in the process of deriving typical costs for a work-related incident. These include derivation of inflation and savings rates, average age at the time of the incident by nature and severity category and average cases costs for various types of payments (such as medical, legal and travel costs).

Table A1.4: Parameters required for cost estimation

Item	Description	Estimate
Average earnings	Proxy for productivity, ABS Employee Earnings and Hours survey (ABS Cat. No. 6306.0), May 2014. Average weekly total earnings, persons, all employees.	\$1 516 pw \$1 577 pw + overtime
Discount rate	Opportunity cost of money: Average of rates of return for private and government saving instruments and RBA target for January 2006 to June 2013 (RBA table F2).	4.50% p.a.
Inflation rate	Average of annual weighted ABS Consumer Price Index (CPI, ABS Catalogue 6401.0), March 2006 to June 2013.	2.60% p.a.
Productivity rate	Annual increase in workers' productivity. Commonwealth Government Intergenerational Report.	1.75% p.a.
Bulk-billing rate	Proportion of consultations that are bulk-billed (source: DoHA Medicare statistics).	71.7% of cases
Private Health Insurance take-up	Private Health Insurance Administration Commission (PHIAC) estimates of coverage of health insurance, June 2015.	46.9% of cases
Reduced life expectancy for long term cases	AIHW Healthy Life Expectancy (HALE) (Source: AIHW Mortality, Life Expectancy, www.aihw.gov.au/mortality/data/life_expectancy.html).	73 years
Retirement age	Median retirement age of older Australians (Source: ABS Retirement and Retirement Intentions, December 2013, ABS Catalogue 6238.0).	66 years
Average time to settlement of claims	Average of weighted average of expected term to settlement (Workers' compensation jurisdiction annual reports, 2000–01).	3 years
Average overtime pay rate	Difference between average weekly ordinary time earnings and average weekly earnings (Source: ABS Employee Earnings and Hours, May 2010, ABS Catalogue 6306.0).	4.5%
Medical costs ^a	Total medical costs per claim: 75% of goods and services payments per claim, by severity and nature (NDS).	Dependent on severity category (Table A2)
Travel costs ^a	Total travel expenses per claim: 6% of non-compensation payments per claim, by severity and nature (NDS).	Dependent on severity category (Table A2)
Pain and suffering costs ^a	Compensation for pain and suffering: 19% of compensation payments per claim, by severity and nature (NDS).	Dependent on severity category (Table A2)

^a See table A1.5 for estimates by severity category and nature

Average earnings used in present value calculations for lost income and lost productivity estimates are based on ABS estimates of ordinary time and total earnings for all employees (full-time and part-time, managerial and non-managerial). While the majority of work-related injury and illness cases are likely to occur to non-managerial employees, the exact composition of cases for this dimension is only estimable for compensated cases.

For this reason, we adopt the approach of using the all employees average weekly earnings from AWE as the standard wage rate, noting that Appendix 3 presents a summary of the sensitivity of the cost estimate to changes in key parameters such as average earnings.

Analysis of the distribution of age at the time of the incident (based on NDS data for compensated cases) suggests that the average ages presented in Table A1.5 are reasonable estimates for the age for a typical case. While the distributions of age for each severity category are positively skewed, in most cases there is little difference between the average value and the median value.

Table A1.5: Parameters specific to severity and nature categories

Item	Unit		Short absence	Long absence	Partial incapacity	Full incapacity	Fatality
Average duration of absence	Days	Injury	0.9	31.9	225.0	276.9	43.6
		Disease	0.8	40.3	189.9	394.4	21.9
Average age at incident	Years	Injury	33	35	41	37	37
		Disease	37	39	42	46	51
Average medical cost	\$/claim	Injury	\$820	\$3 010	\$12 980	\$12 515	\$2 430
		Disease	\$1 080	\$3 020	\$5 680	\$8 550	\$340
Average investigation cost	\$/incident		\$28	\$527	\$832	\$2 374	\$2 840
Average travel costs	\$/claim	Injury	\$5	\$25	\$160	\$260	\$190
		Disease	\$40	\$50	\$220	\$380	\$1 320
Medicare coverage of costs	%	All claims	66%	30%	17%	12%	6%

Source: NDS

Table A1.6 summarises the calculated items that comprise the total costs estimate. The table shows the major cost groups and categories, with costs further divided into burden by economic agent. Table 2.1 on page 27 of this report presents these figures with a breakdown by severity and nature of incident, using the classifications created in Tables A1.1 to A1.3.

Table A1.6: Summary of cost estimates for injury and illness, \$m, 2012–13^a

Total Costs	Total	Employer		Worker		Society		
Production disturbance costs (PDC)			Value of production			Welfare payments	268	
			Employer excess	201		Tax revenue foregone	290	
			Sick leave	528		Compensation payments ^c	567	
	Value of production	4 623	VOP(E)	1 541	–	VOP(S)		
	Staff turnover	156	Staff turnover	156	–		–	
PDC	4 779	PDC(E)	2 450	PDC(W)^b	1 204	PDC(S)	1 125	
Human Capital costs (HKC)						Welfare payments	277	
						Tax revenue foregone	774	
						Compensation payments ^c	7 133	
HKC	54 110	HKC(E)	–	HKC(W)^d	45 927	HKC(S)^c	81 84	
Medical costs (MEDC)				Gap/Private Rehabilitation	294	Medical Rehabilitation	891	
	MEDC	1 324	MED(E)	96	MED(W)	294	MED(S)	935
Administration costs (ADMINC)			Legal costs	426	Legal costs	337	Legal costs	76
			Penalties	12			Penalties	–
							Deadweight loss	2
	Legal costs	853	Legal costs	438	Legal costs	337	Legal costs	78
	Investigation costs	465	Investigation costs	76			Investigation costs	390
	Travel costs	50			Travel costs	36	Travel costs	14
	Funeral costs	4			Funeral costs	4	Funeral costs	0
ADMINC	1 369	ADMINC(E)	513	ADMINC(W)	373	ADMINC(S)	482	
Transfer costs (TRANSC)						Welfare deadweight loss	27	
						Tax deadweight loss	115	
TRANSC	143		–		–	TRANSC(S)	143	
Other costs (OTHERC)					Carer costs	36		
					Aids and modifications	11		
OTHERC	47		–	OTHERC(W)	47		–	
Total^e	61 770		3 059		47 845		10 868	

a Figures are rounded to the nearest \$10 million

b $PDC(W) = PDC - [PDC(E) + PDC(S)]$

c Total compensation payments are estimated at \$7.7 billion, of which \$562 million are short term (the period up to return to work or replacement) and \$7.14 billion are long term payments (following return to work or replacement).

d $HKC(S) = Welfare(S) + Tax(S) + CompPay(S) \Rightarrow HKC(W) = HKC - HKC(S)$

e $Total = PDC + HKC + MEDC + ADMINC + TRANSC + OTHERC$

APPENDIX 2. ECONOMIC COSTS BY STATE OR TERRITORY

Table 2.3a in Section 2 shows a summary of total and unit costs by Australia state or territory. This appendix expands on the information presented in the main body of the report by presenting a summary of costs by severity and cost category at the state level.

Table A2.1 below summarises total costs by state or territory for the economic agents included in the model and the major conceptual groups from Table 1.1.

Table A2.1: Cost of work-related injury and illness by Australian state and territories, by economic agent, conceptual cost category and severity category. 2012–13 (\$ million)^a.

Category		New South Wales	Victoria	Queensland	Western Aust.	South Aust.	Australian Capital Territory	Tasmania	Northern Territory	Australia
Economic agent	Employers	790	610	540	350	210	70	70	30	2 670
	Workers	12 840	11 460	9 360	5 940	3 700	890	1 100	440	45 730
	Society	3 670	2 530	2 400	1 610	1 090	850	630	530	13 310
Conceptual category	Production disturbance	1 270	990	870	580	330	110	110	40	4 300
	Human capital	14 920	12 650	10 530	6 660	4 080	1 260	1 250	540	51 890
	Medical	380	310	260	150	110	30	40	10	1 290
	Administration	660	610	580	490	460	400	410	400	4 010
	Transfer	40	30	30	20	10				130
	Other Costs	10	10	10	10					40
Severity category	Short absence	420	250	240	160	110	90	50	40	1 360
	Long absence	2 120	1 500	1 430	970	660	470	390	320	7 860
	Partial incapacity	12 650	11 150	9 020	5 740	3 660	1 080	1 160	530	44 990
	Full incapacity	1 060	740	710	450	260	100	90	50	3 460
	Fatality	1 120	950	880	520	310	90	110	60	4 040
Total		17 300	14 600	12 300	7 900	5 000	1 810	1 800	1 000	61 800

^a Units are rounded to the nearest \$10 million

The basic pattern of distribution of costs, by of the categories in Table A2.1, shows very little variation between jurisdictions. This is particularly the case for conceptual cost categories, where around 85 per cent of total costs are categorised as human capital costs.

The relative cost borne by workers and society shows some variance between jurisdictions, from a low of 60 per cent borne by workers in the Australian Capital Territory to a high of 78 per cent in Victoria.

APPENDIX 3. SENSITIVITY ANALYSIS

During the process of estimating the total costs of work-related injury and illness, a number of assumptions concerning key parameters and distributions are required. In some cases, these are guided by available data or studies but it is not always possible to isolate parameters in this way.

This section of the report analyses the effects on the overall cost estimate from changes in key parameters and assumptions, including:

- average weekly earnings
- formulation of the discount rate for present value calculations
- retirement age
- average life expectancy
- medical costs of uncompensated cases compared with compensated cases
- level of earnings following return to work for severity category 3 (temporary incapacity and return to work with reduced capacity)
- average taxation revenue foregone from injured workers
- non-compensated disease fatalities, and
- definition of total cases.

Table A3.1 presents a summary of the possible range of estimates for key parameters that are used in the analysis.

Table A3.1: Parameter estimates

Parameter	Baseline estimate in study	Lower bound	Upper bound	
Ordinary time earnings/Total earnings (AWE ABS 6306.0)	ABS AWOTE AWE	\$1 515 pw \$1 577 pw	\$1 162 pw \$1 2101569*1.0405 pw (Adult non-managerial)	\$1 569 pw \$1 633 pw (Adult full time)
Savings rate	Average investment rates, January 2006-2013 (RBA Bulletin)	4.5% pa	6.00% (Average investment rates Jan 1990–2013)	4.3% (actuarial estimates for CPM project)
Inflation rate	Average quarterly CPI growth, March 2006–2013 (ABS CPI)	2.6% pa	2.30% (Average CPI growth March 2009–2013)	3.70% (Average CPI growth March 1982–2013)
Discount rate	Savings – inflation	1.9% pa	3.7%	0.6%
Productivity improvements	Annual increase in workers' productivity, Commonwealth Government Intergenerational Report	1.75%	1.5% (2015 report)	2.2% (highest recorded rate)
Retirement age	Median age of retirement, ABS 6238.0	66 years	53 year (ABS average retirement age)	70 years
Medical costs of uncompensated cases		100%	75%	n/a
Level of earnings following return to work		64%	75%	50%
Average tax rate for foregone revenue		25%	20%	50%
Non-compensated disease fatalities	NOHSC estimate of total work-related disease fatalities	2 170	0 (NDS data only)	7 500 (NOHSC estimate of upper bound for work-related disease fatalities)

Table A3.2 summarises the range of cost estimates by applying (where appropriate) the range of parameters value specified in Table A3.1, holding the values of all other parameters and estimates to their baseline values.

These results indicate that a reasonable range of cost estimates could be derived to lie between \$47 billion and \$80 billion. The results of this sensitivity analysis also indicate that the estimate of costs is reasonably robust to changes in the parameter estimates and assumptions. The parameter estimates that appear most crucial to the estimated level of costs are the definition of earnings, the discount rate used for present value calculations, the estimated average of pre-injury earnings following return to work and retirement age.

The discount rate in these calculations is calculated by subtracting the inflation rate from the savings rate. The productivity rate is also applied for present value calculations involving real wages.

The results presented in Table A3.2 support the view that the level of total costs presented in Section 2 is a conservative estimate, since the **\$61.8 billion** baseline estimate lies further towards the lower end of the estimated range.

Table A3.2: Cost estimate ranges for selected parameter changes

Parameter	Parameter range (baseline parameter)	Lower bound for total costs (\$ million)	Upper bound for total costs (\$ million)
Ordinary time and total earnings	\$1 162– \$1 210 pw \$1 569 –\$ 1 1633 pw	48 000	63 820
Discount rate	0.6% – 3.7% pa (1.9% pa)	51 540	71 450
Productivity improvements	1.5%-2.3% (1.75%)	60 130	65 650
Retirement age	53-70 years (64 years)	48 180	70 770
Medical costs of uncompensated cases	75%-100% (100%)	61 650	n/a
Level of earnings following return to work	75%-50% (64%)	47 120	80 420
Average tax rate for foregone revenue	20%-50% (25%)	61 750	61 900
Non-compensated disease fatalities	0-7 500 (2 170)	58 360	70 150

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