

Australian Government

National Occupational Health and Safety Commission

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

Canberra August 2004

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ISBN 1 920763 58 9

EXECUTIVE SUMMARY

1. In 1995, an Industry Commission study¹ estimated that only 25% of the total cost of work-related injury and disease was due to the direct costs of work-related incidents. The remaining 75% 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.

2. Assuming that the composition of total costs has remained at similar levels to 1992-93 (3:1 indirect to direct costs), the total cost of work-related injury and disease for the 2001-02 financial year would be in excess of **\$31 billion** (based on the National Accounts³ estimate of \$7.64 billion in payments to households from workers' compensation schemes).

3. 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.

4. As part of its strategy of communicating information on the impact of occupational injury, disease and death, the NOHSC Office decided to revisit these estimates. Where new or emerging data sources have allowed, the NOHSC Office expanded on this methodology by including additional estimates for indirect cost items that were identified but not included in the previous study.

5. The resultant methodology and economic cost estimate have been reviewed by independent consultants⁴⁵⁶, to examine and enhance the robustness of the methodology and data sources. The recommendations from these reviews have been incorporated into the original NOHSC office methodology, the results of which are presented in this report.

6. Using this methodology (discussed in detail in Section 1 of this report), the total costs of workplace injury and illness to the Australian economy for the 2000-01 reference year is estimated to be **\$34.3 billion**. This is equivalent to 5 per cent of Australia Gross Domestic Product (GDP) for the 2000-01 financial year. It should be noted that this estimate represented forgone economic activity, and not the proportion of GDP that is lost as a result of work-related injury and illness.

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 ABS Catalogue 5204.0, Australian System of National Accounts, 2001-02.

 ⁴ Indirect Costs of Work Related Injury and Disease, Review of the Estimation Methodology, Report by The Allen Consulting Group to NOHSC, July 2003.
 ⁵ Review of the Methodology and Estimates of Indirect Costs of Workplace Injury/Disease, Report by The Allen

⁵ Review of the Methodology and Estimates of Indirect Costs of Workplace Injury/Disease, Report by The Allen Consulting Group to NOHSC, November 2003.

⁶ 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.

7. In terms of the burden to economic agents, 3 per cent of the total cost is borne by employers, 44 per cent by workers and 53 per cent by the community. 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.

8. If the \$7.5 billion in workers' compensation premiums paid by Australian employers in the 2000-01 financial year were to be redistributed using an "ex-ante" approach (i.e. before the incident), the total cost borne by employers would be 24 per cent and the cost borne by society would be 35 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.

9. 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 \$34.3 billion cost estimate derived from the baseline parameter values is shown to lie towards the lower end of the range of cost estimates produced by this analysis.

10. The total cost estimate for the 2000-01 reference year contains no direct measure of the cost of pain, suffering and early death to injured or ill workers, although some of this cost is implicitly included in the estimates of human capital costs. The cost of pain, suffering and early death could conservatively add a further **\$48.5 billion** to the total cost figure (net of human capital costs already included in total costs), leading to a total cost estimate of **\$82.8 billion**. This figures are based on an estimation methodology proposed in Access Economics review. It should be noted that this figure is not directly comparable with the GDP estimate, which is purely an economic measure. There are also a number of issues with the estimation methodology that mean that this figure should be treated as indicative only.

11. 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 (2000-01 for 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 occupational health and safety cost equation. For example, the costs incurred by employers for compliance with occupational health and safety regulations and prevention activities, and are not considered within the scope of the current study.

12. The NOHSC office is planning to undertake a review of the relevant literature with a view to developing a plan for estimating the costs of compliance, prevention and similar activities as a counterpart to the cost estimate developed in this report.

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LIST OF ABBREVIATIONS

- **ABS** Australian Bureau of Statistics
- AIHW Australian Institute of Health and Welfare
- **ADMINC** Administration Costs
- ANA ABS Australian System of National Accounts (Catalogue No. 5204.0)
- AWE Average weekly earnings (total earnings)
- **AWOTE** Average Weekly Ordinary Time Earnings (excluding overtime)
- **CPI** ABS 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
- DoHA Commonwealth Department of Health and Aging
- **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 Office
- 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

13. 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 of these groups varies with the severity of the injury or disease.

14. 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 to Australian businesses, workers and government.

15. The purpose of this study is to update the 1995 Industry Commission estimate of total costs of work-related injury, illness and death, using 2000-01 financial year data, while also adding to or modifying the previous methodology where new or emerging data sources and methodologies allow.

16. 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.

17. The methodology used in this study is an adaptation of the original Industry Commission method with further modifications based on the recommendations of independent reviews of the method by The Allen Consulting Group⁷ and Access Economics⁸.

18. 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.

19. Section 3 gives a summary of the inclusion of estimates of pain, suffering and early death to the baseline results presented in section 2.

20. 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.

⁷ Review of the Methodology and Estimates of Indirect Costs of Workplace Injury/Disease, Report by The Allen Consulting Group to NOHSC, November 2003.
⁸ Costs of Workplace Injury and Illness: reviewing the estimation methodology and estimates of the level and dis

⁸ 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.

SECTION 1. METHODOLOGY

Methodological considerations

21. 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 using new workers' compensation cases for the reference year and estimating the future cost associated with each new case 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.

22. The basic methodology for deriving an estimate of economic costs is to identify and define the categories of indirect 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.

23. 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.

24. 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 property or humans, 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. The nature of the compensation based data on which the estimate of work related injuries and illnesses are based means the costs associated with incidents in which no claim is made (or no injury or illness results) 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

25. The economic costs associated with work-related injury and illness were estimated for a range of indirect cost items over 5 severity categories, ranging from short periods off work with full return to normal duties to permanent incapacity and fatality (see paragraph 51 for the definition of severity categories).

26. 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
- 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 a aggregating over all classes of incidents.

27. 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

28. The Access Economics review 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 entering the compensation system 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.

29. The incidence approach assesses the number of people entering the compensation (or medical) systems during a particular year as a result of work-related accident 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 where already in the system at the start of the current reference year.

30. The 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.

31. The cost estimate 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' compensated claims for the reference year and thus readily lends itself to using the incidence approach to estimate the number of cases.

32. The literature on the topic provides little guidance to the best approach, however the general trend appears to be away from the prevalence approach towards the incidence approach when the nature of the data allows for this method to be employed, because of the difficultly of obtaining accurate prevalence type data in most instances.

33. 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.

34. 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 occurring into the future from these cases are estimated using present value calculations over the expected lifetime of the case.

35. 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.

Distributing costs using an 'ex-post' approach

36. As discussed in paragraph 20, 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

37. 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.

38. 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".

39. 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 81 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

40. 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.

41. As revealed in the review by Access Economics, similar studies have developed a classification structure for economic costs 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 though 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,
- other costs includes costs not classified in other areas, such as the cost of carers and aids and modifications and the cost of pain and suffering to injured workers.

42. 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).

43. 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).

44. 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.

45. 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. A description and analysis of these estimates is included in Section 3 of this report.

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, net of compensation, welfare and tax	Compensation and welfare payments transferred to worker for temporary loss of wage; tax losses prior to RPR;
	Staff turnover costs	Sick leave Staff turnover costs	Zero	Zero
Human capital costs	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	Threshold medical payments	Gap payments	Compensation medical payments
	of the injury		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
	Cost of funeral today's minus present value of future cost	Zero	Net costs of bringing forward funeral	Travel concession Compensation for funeral costs
Transfer 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)
				Deadweight costs of tax losses
Other	Suffering/early death	Zero	Suffering, early death (net of compensation)	Compensation payments for same
	Carers	Zero	Carer costs net of carer payment/allowance Aids etc (net cost after reimbursements)	Payments to carers plus
	Aids, equipment and modifications	Zero		Reimbursements for aids etc plus deadweight cost
Source: Access Economic	s P/L 2004 Report on "The C	osts of Work-related Injury and	Illness"	

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

Measuring lost productivity

46. 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.

47. 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.

48. 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, the view of the NOHSC office is that human capital costs be included in total costs, since forgone 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.

49. As an example, consider the case of a worker suffering a permanently incapacitating disease at age 46, earning \$653 per week. In the short term, production disturbance costs for the individual are equal to the value of the workers wages (plus on-costs and overtime) over the time lost before replacement (8.5 weeks), or \$8 800. 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 62, and using a discount rate of 1.55% (see paragraph 57), the human capital cost to the economy would be \$540 000. This is cost is partially borne by the worker (lost income) and society (lost potential output and deadweight losses).

50. A review of the relevant literature by Access Economics concluded, from work in similar studies (such as Leigh et. al. estimating the cost of occupational injuries and illnesses to the United States economy⁹), that the human capital/lost wages approach is predominantly used to estimate lost productivity. Indeed, this method was used by the Bureau of Transport Economics when estimating total road crash costs in Australia for 1996¹⁰.

⁹Leigh J.P. et. al. (2000), Costs of Occupational Injuries and Illnesses.

¹⁰ Bureau of Transport Economics (2000), Road Crash Costs in Australia, BTE Report No. 102, Canberra.

Identifying the levels of severity of work-related incidents

51. 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.

52. Generally, 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, 5 mutually exclusive categories of severity were created to define the level of severity (Table 1.2). In general, work-related incidents that do not involve absences from work are excluded from the analysis on the assumption that they contribute negligibly to total costs. 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.

53. 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 long latency period.

Tuble 1.2. Deventy bategories	
Severity Category	Definition
Less than 5 days off work	A minor work-related injury or illness, involving less than 5 days absence from normal duties, where the worker was able to resume full duties.
Five days or more off work and return to work on full duties	A minor work-related injury or illness, involving 5 or more days and less than 6 months off work, where the worker was able to resume full duties.
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 on reduced duties, more than 6 months after first leaving work and over time resuming 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).
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	A work-related injury or disease, which results in death.

Table 1.2: Severity categories

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 or	d data sources	for indirect	cost itoms
	Demnitions an	ia dala sources	siorinaireci	. 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	ABS Employee Earnings and Hours, ABS Cat. No. 6306.0 and
		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, ABS Cat. No. 6306.0 and
		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, ABS Cat. No. 6306.0,
		NDS workers' compensation data and Social Welfare Payments
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 permanent injury or fatality: loss of earnings from time of injury to retirement age (assumed to be 65 years), assuming a discount profile and productivity loss. For a	ABS Employee Earnings and Hours, ABS Cat. No. 6306.0,
	permanent injury, future earnings can also include average social welfare payments received (since these contribute to post-injury income).	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 and Workers' Compensation Jurisdictions' Annual Reports
Legal fines and penalties ^a	Average fine/legal cost associated with a prosecution following investigation	WRMC Report 2002
Legal costs and overheads ^a	Non-compensated legal costs associated with a typical work- related incident.	CPM report estimates of the disputation rate amongst workers' compensation claims and the average legal costs for dispute
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 and Workers' Compensation Jurisdictions Annual Reports
Social welfare payments	For severe incidents, average social welfare payment per recipient	Department of Family and Community Services Annual Report, 2001-02 (Output Group 3.1 and 3.2)
Rehabilitation	Average cost of rehabilitation per recipient, for cases involving lower duties, permanent incapacity or fatality.	Department of Family and Community Services Annual Report, 2001-02 (Output Group 3.2).
Loss of government revenue ^a	For permanent incapacity or fatality, taxation and other revenue forgone 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)
^a Indirect costs items inclu	uded in the estimate of total costs that were considered but not esti	mated in the 1995 Industry

Commission report

Distribution of indirect cost items by severity category

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

55. 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.

56. 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 2000-01 financial year, 618 convictions for \$7.9 billion were recorded, leading to an average fine per conviction of \$12 750. For this category, costs are assumed to be incurred for permanent and fatal cases only, with prosecution rates of 3% for permanent cases and 50% for fatal cases.

	Severity Category							
Indirect Cost Item	Temporary < 5 days off work	Temporary return to full duties	Temporary, reduced return	Permanent incapacity, no return	Fatality			
Value of production	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			
Overtime and over-employment	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			
Employer excess costs	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			
Staff turnover and training/retraining costs			\checkmark	\checkmark	\checkmark			
Loss of future earnings (Human capital costs)			\checkmark	\checkmark	\checkmark			
Medical and rehabilitation costs	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			
Legal Costs ^a				\checkmark	\checkmark			
Investigation costs ^a	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			
Travel costs	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			
Social welfare payments		\checkmark	\checkmark	\checkmark	\checkmark			
Loss of government revenue		\checkmark	\checkmark	\checkmark	\checkmark			
Carers and modifications and aids				\checkmark				
Pain and suffering	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			
^a These indirect cost items are estima	^a These indirect cost items are estimated in aggregate across all applicable severity categories							

Table 1.4: Distribution of indirect cost items by severity category

Discounting future monetary values and the discount rate

57. 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.

58. 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 forgone 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 in 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.

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

60. 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 5.8% p.a. for savings and 2.5% p.a. for inflation. This represents a discount rate of 3.3%. When considering wage present value calculations, the productivity rate of 1.75% p.a. was applied, leading to a modified discount rate of 1.55%. Applying a range of possible rates (based on the historical period on which the rates cover, with longer period giving higher average rates) to the calculation of total costs leads to a range of costs of between \$32 billion and \$41 billion.

Estimates of pain and suffering

61. In addition to the major cost categories identified in this report, estimates can also be included for the total cost of pain and suffering and early death to workers experiencing work-related injury and illness. A description and analysis of these estimates is included in Section 3 of this report.

62. These estimates are reported separately from the cost estimate presented in Section 2 due to limitations in the estimation methodology and the number of assumptions required to produce the estimate. The estimate presented in section 3 should be treated as indicative only, due to empirical difficulties in measurement with the willingness to pay methodology that underpins the estimate of the cost of pain and suffering. The methodology developed by Access Economics produced a range of values for the cost of pain and suffering. Only the lower bound of this range of estimates in reported in section 3.

63. In addition, since estimates of this type can not be considered as strictly economic costs, the total cost estimates from this exercise should not be directly compared with traditional economic indicators such as GDP.

Determining the number of incidents in each severity category

64. The total number of work-related incidents occurring in 2000-01 for Australia is estimated using an "incidence" approach, in which only those incidents that occurred in the 2000-01 financial year are included in the total. The total number of incidents is estimated by combining information from the NOHSC National Dataset for Compensation Based Statistics (NDS) and the ABS Work-related Injuries survey¹¹. Cases are categorised by severity category, nature (injury or disease) and compensation status (compensated or non-compensated).

65. NDS data provide the total number of accepted new compensation claims submitted to workers' compensation jurisdictions during the 2000-01 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 2000-01. 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, casual etc) and some industries (such as agriculture and construction) will be significantly under-covered in the NDS data.

66. The ABS Work-related Injuries Survey (WRIS) is used as a base for total non-fatal work-related incidents (compensated and non-compensated). 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.

67. Another aspect of the WRIS to be considered is self reporting of the workrelatedness 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 WRIS. It is not clear what affect 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)¹² data suggests that this distinction has less effect for permanent and longer term cases. Since the determination of workrelatedness in SEAS is conceptually similar to the method used for the WRIS, it is reasonable to assume that the same comparison will apply between NDS and WRIS. If this is the case, the effect on the level of total costs will be minor, since the largest contributors are permanent and long term injury or illness, where there are only minor differences between the surveys in terms of the definition of in-scope incidents.

68. In 2000-01, WRIS estimated that 477 600 workers (or 5% of the working population) experienced a work-related incident. Of this total, 288 300 did not receive compensation (either because no application was made or the application was rejected

¹¹ ABS Catalogue 6324.0, Work-related Injuries, September 2000.

¹² ABS Catalogue 6361.0, Employment Arrangement and Superannuation, April to June 2000.

on grounds other than work-relatedness). The major reason for not applying for compensation was that the injury or illness was deemed to be too minor (127 400 workers). These incidents have been excluded from the analysis since they are likely to contribute only a negligible amount to total costs.

69. Applying these restrictions leaves an estimated 350 200 workers injured during 2000-01. Of these, 160 900 were not compensated and 189 300 received compensation. Table 1.5 summarises the distribution of total injured workers from the ABS Work-related injuries survey, by nature and duration.

	Time a manife d	NI	O a man a mar a tila m	T -4-1				
	l ime period	No compensation	Compensation	Iotai				
Injuries ^a	0-4 days	87 700	86 800	174 500				
	5+ days	56 200	80 700	136 900				
	Total	143 900	167 500	311 400				
Disease	0-4 days	6 000	5 900	11 900				
	5+ days	11 000	15 900	26 900				
	Total	17 000	21 800	38 800				
All incidents	0-4 days	93 700	92 700	186 400				
	5+ days	67 200	96 600	163 800				
	Total	160 900	189 300	350 200				
^a Injury and disease	^a Injury and disease claims are split using the distribution of injury/disease claims from the NDS. For 0 to 4 days							

Table 1 5: Work related in	niuriae hy duration	of absonce and nature	2000 01
	ijulies by uulation	i ol absence and nature,	2000-01

^a Injury and disease claims are split using the distribution of injury/disease claims from the NDS. For 0 to 4 days duration this resolves to 93.6% accounted for by injury claims and for 5+ days 83.6% by injury claims. Source: ABS 6324.0, Work-related Injuries, September 2000

70. For incidents resulting in an absence of 4 days or fewer, the ABS estimate is adopted as the best estimate of the number of incidents. This is because NDS data have a known under-coverage of short duration claims due to a number of workers' compensation schemes operating with an employer excess period (typically of 5 days). The NDS estimate of total non-fatal injury and disease cases for 2000-01 is 236 346, compared with the 350 200 cases from the WRIS. This is difference is attributed to non-compensated and short duration cases, as described below.

71. For the remaining non-fatal incidents, NDS claim totals are used as the estimate of compensated incidents with the remaining incidents (ABS estimate less NDS total) used as the estimate of non-compensated claims. It is assumed that the distribution of all incidents between the appropriate severity categories (temporary full and reduced return and permanent) will be similar to the distribution for compensated (NDS) claims.

72. Estimates of fatal incidents are sourced from a separate NOHSC Office project estimating the number of work-related fatalities, for injury and disease¹³. These estimates replace the NDS totals for fatal claims, which are known to be an underestimate, particularly for disease claims. This study uses an estimate of 2 210 work-related disease fatalities. It should be noted that this is considered to be a conservative estimate, with recent studies estimating that as many as 7 000 fatalities may occur each year as a result of work-related disease. Table 1.6 summarises the

¹³ NOHSC Office Report on estimating total workplace fatalities for Australia.

estimated distribution of work-related incidents by nature and severity category derived from this process.

73. The estimate of the number of cases developed for this study is considered a preliminary estimate of work-related incidents only. Analysis is currently underway to improve these estimates, particularly relating to areas such as bystander claims and permanent incapacity cases for disease. When additional data relating to the number of claims becomes available, they will be used to update total costs. As an example, for incidents of work-related disease resulting in permanent incapacity, if the estimate of the number of non-compensated incidents were ten times higher¹⁴ than the current estimate (200), the estimate of total costs would increase by approximately \$600 million (or 1.5% of total costs).

Table 1.6: Number and distribution of work-related incidents by severity category, Australia, 2000-01

			Temporary < 5 days off work	Temporary return to full duties	Temporary, reduced return	Permanent incapacity, no return	Fatality	All Incidents
	Compensated	Per cent	41	43	5	11	0	100
lniuny		Number	86 800	92 100	10 600	22 300	273	212 075
nijury	Not	Per cent	88	9	1	2	0	100
com	compensated	Number	87 740	8 800	1 000	2 100	137	99 775
Compensated Disease Not compensated	Per cent	19	42	31	8	0	100	
	Compensaleu	Number	5 900	12 800	9 500	2 300	123	30 621
	Not	Per cent	58	12	9	2	20	100
	compensated	Number	5 962	1 200	900	200	2 087	10 350

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

74. The average duration of absence for each severity category is determined using NDS data and presented in Table 1.7 below. This analysis is based on the 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.

75. 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. As such, these estimates are likely to be a lower bound for time lost for compensated cases. 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.

¹⁴ In the estimate of fatalities, the final estimate of disease fatalities (2 210) is eighteen times higher than the NDS estimate.

76. Additionally, the duration of absence figures in Table 1.6 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 4 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 1.7: Average duration of absence (in weeks) by nature and severity categor	y, Australia,
2000-01	

	Temporary < 5 days off work	Temporary return to full duties	Temporary, reduced return	Permanent incapacity, no return	Fatality ^a
Injury	0.4	4.6	44.1	37.1	9.6
Disease	0.4	6.4	21.4	42.7	70.4

^a 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.

Source: NOHSC National Dataset for compensation based statistics (NDS)

Determining the typical costs of a work-related incident

77. The typical 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.

78. Table 1.8 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 \$92 700 and \$132 400 respectively.

Table											
		Temporary < 5 days off work	Temporary return to full duties	Temporary, reduced return	Permanent incapacity, no return	Fatality	Average				
Employer	Injury	360	4 100	8 060	7 970	11 880	2 470				
	Disease	350	4 590	6 900	8 320	25 680	5 320				
)A/ankan	Injury	70	520	122 950	433 810	324 780	39 250				
WORKER	Disease	230	730	121 370	433 560	203 060	69 100				
Community	Injury	1 410	14 610	122 570	516 750	371 950	51 120				
Community	Disease	7 120	20 650	60 740	411 800	151 704	58 400				
A11	Injury	1 830	19 210	253 650	958 410	707 320	92 700				
All	Disease	7 590	25 720	188 590	854 500	380 900	132 400				

Table 1.8: Typic	al indirect co	osts (\$	per incident) for wor	k-related incid	dents, Aust	ralia, 2000-01
	-		-	-	-		

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

Unit costs are rounded to the nearest \$10.

Calculation and distribution of total costs

79. The total cost of work-related injury and disease is calculated by combining the information relating to the number of work-related incidents (Table 1.6) and average cost of incidents by severity category (Table 1.8). Section 2 presents a summary of the application of this methodology.

SECTION 2. RESULTS

80. 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, economic agent and the type and severity of the incident.

81. The cost of work-related injury and disease to workers, their employers and the community was estimated to be in excess of \$34 billion, based on 2000-01 financial year data. Injuries account for \$28.9 billion of the total economic cost (84%), with the majority of cost borne by individuals and society (97%). 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.

82. Under the "ex-ante" approach, workers' compensation premiums paid by employers (estimated to be \$7.5 billion in the 2000-01 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 rises to \$8.5 billion (25%) and the societal burden becomes \$10.8 billion (32%). 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).

		Temporary < 5 days off work	Temporary return to full duties	Temporary, reduced return	Permanent, no return	Fatality	Overall cost (ex- post)	Overall cost (ex- ante)
Employer	Injury	100	400	100	200	0	800	
	Disease	0	100	100	0	100	200	
	Total						1 000	8 500
	Injury	0	100	1 400	10 600	100	12 200	
Worker	Disease	0	0	1 300	1 100	500	2 800	
	Total						15 000	15 000
	Injury	300	1 500	1 400	12 600	200	16 000	
Community	Disease	100	300	600	1 100	300	2 300	
	Total						18 300	10 800
	Injury	300	2 000	2 900	23 400	300	28 900	
All	Disease	100	400	2 000	2 200	900	5 400	
	Total	400	2 400	4 900	25 600	1 200	34 300	34 300
Linite are roun	dod to the ne	arast \$100 million						

Table 2.1: Total costs of work-related injury and illness (\$ million). Australia. 2000-01

Units are rounded to the hearest \$100 million

83. 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.

	Injury		Dise	ease	Total		
	Total Cost (\$ billion)	Unit cost (\$ per incident)	Total Cost (\$ billion)	Unit cost (\$ per incident)	Total Cost (\$ billion)	Unit cost (\$ per incident)	
Employer	0.77	2 500	0.22	5 400	0.99	2 800	
Worker	12.20	39 100	2.82	68 700	15.02	42 500	
Community	15.93	51 100	2.39	58 300	18.32	51 900	
Total	28.90	92 600	5.43	132 400	34.33	97 200	

Table 2.2: Total cost (\$ billion) and average cost (\$ per work-related incident) for work-related injury and illness, Australia, 2000-01

84. Based on these estimates, the average cost to the individual is considerably higher for work-related diseases (\$68 700) than for an injury (\$39 100). In contrast, the cost to the community is not as dependent on the type of incident (\$51 100 per incident for injury compared with \$58 300 per incident for disease).

85. The average unit cost for a work-related incident, borne by all economic agents, is estimated at \$97 200. Unit costs for diseases are estimated to be higher than unit costs for injuries (\$132 400 compared with \$92 600).

86. Table 2.3a shows the distribution of estimated total costs and unit costs by location (jurisdiction) of operation of the workplace. The differences in treatment of permanent incapacity claims between jurisdictions are likely to have a significant effect on the distribution of total costs. Whilst some 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 44 per cent of the total cost from 39 per cent of total Australian cases. This is also reflected by the high unit cost of work-related incidents of \$110 400 per case for New South Wales.

87. The unit cost by jurisdiction is also reflected in the comparison between costs and gross domestic product (GDP) or gross state product (GSP), where New South Wales and Australian Capital Territory have the highest percentage of GSP (8.7 and 6.1). Appendix 2 presents a more detailed distribution of total costs by jurisdiction.

Table 2.3a: The cost (\$ million)	of work-related injury	/ and illness, by	Iocation of	workplace,
2000-01		-		

	Injury	Disease	Total	% of GDP/	Distributi	on (%)	Unit Cost
JURISDICTION	Total	Total cost (\$ million)			Costs	Cases	\$/case
New South Wales	12 700	2 400	15 100	6.1	44	39	110 400
Victoria	5 000	1 000	6 000	3.4	18	18	94 400
Queensland	4 800	800	5 600	4.9	16	19	85 000
Western Australia	2 400	400	2 800	3.8	8	9	84 700
South Australia	2 100	500	2 600	5.7	8	9	88 100
Australia Capital Territory	1 000	200	1 200	8.6	4	3	118 700
Tasmania	600	100	700	5.9	2	2	87 000
Northern Territory	300	0	300	3.5	1	1	100 300
Australia	28 900	5 400	34 300	5.0	100	100	97 200

Units are rounded to the nearest \$100 million

a Source: ABS State Accounts (Catalogue No. 5220.0), November 2003. Compared with 2000-01 estimates of 2001-02 reference year chained volume measures of GDP and GSP.

88. 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 manufacturing industry, which bears 22 per cent of the cost from 20 per cent (with a unit cost of \$107 400 per case) of the total number of incidents, while retail trade bears only 7 per cent of the total cost from 11 per cent of the total number of incidents (a low unit cost of \$65 000 per case). The manufacturing, construction and health and community services industries account for over 40 per cent of total costs. The mining industry had the highest unit cost of \$194 800 per case, however only 2 per cent of the total number of cases for Australian in 2000-01 occurred in the mining industry.

Table 2.3b: The cost (\$ mi	lion) of work-related injury	y and illness, by	industry of workplace,
2000-01	,		

lurisdiction	Injury	Disease	Total	Distributi	on (%)	Unit Cost
	Total	cost (\$ mill	ion)	Costs	Cases	\$/case
Agriculture, Forestry, Fishing	1 200	200	1 400	4	5	92 100
Mining	900	200	1 100	3	2	196 600
Manufacturing	6 300	1 300	7 600	22	20	107 400
Electricity, Gas and Water	300	100	300	1	1	132 000
Construction	3 000	600	3 600	11	10	109 500
Wholesale Trade	1 500	200	1 700	5	5	108 600
Retail Trade	2 200	300	2 500	7	11	65 000
Accommodation	1 000	100	1 100	3	5	61 800
Transport and Storage	2 600	500	3 100	9	8	118 200
Communication Services	500	100	600	2	2	112 800
Finance and Insurance	400	100	500	2	1	117 700
Property and Business	2 200	300	2 500	8	7	113 300
Government Admin/Defence	1 100	300	1 400	4	3	115 400
Education	1 200	300	1 500	5	5	95 600
Health and community services	2 900	500	3 400	10	11	90 300
Cultural and recreational services	500	100	600	2	2	78 000
Personal and other services	1 100	200	1 400	4	4	102 100
Australia	28 900	5 400	34 300	100	100	97 200
Units are rounded to the nearest \$	100 million					

89. Table 2.3c shows the distribution of total costs and unit costs by age and gender for the 2000-01 financial year. These costs are based on estimates of number of cases and average total earnings by each group.

90. The unit cost of a work-related injury or illness is considerably higher from males than for females. While females account for nearly one third of all cases, only one quarter of total costs are attributed to these cases. The unit cost of a work-related injury or disease rises with age, while over two thirds of cases and over three quarters of costs are originate from workers in the 24 to 54 year age group.

Croup	Injury	Disease	Total	Distribution (%)		Unit Cost			
Gioup -	Total cost (\$ million)			Costs	Cases	\$/case			
-24 years	3 800	400	4 200	12	19	62 300			
25 to 34 years	7 000	1 100	8 100	24	24	98 200			
35 to 44 years	8 200	1 600	9 800	28	26	106 600			
45 to 54 years	7 100	1 700	8 800	26	22	116 800			
55 years and over	2 700	800	3 500	10	10	106 600			
Female	7 300	1 300	8 600	25	32	76 800			
Male	21 600	4 100	25 800	75	68	107 200			
Australia	28 900	5 400	34 300	100	100	97 200			
Units are rounded to the nearest \$100 million									

Table 2.3c: The cost (\$ million) of work-related injury and illness, by gender and age group, 2000-01

91. 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, 2000-01

		Temporary < 5 days off work	Temporary return to full duties	Temporary, reduced return	Permanent incapacity, no return	Fatality	Total
loiuny	Unit cost (\$)	1 800	19 200	252 800	956 000	707 300	92 600
injury .	Total cost (\$m)	320	1 940	2 930	23 410	290	28 890
ן Disease	Unit cost (\$)	7 600	25 700	188 600	850 600	380 100	132 400
	Total cost (\$m)	90	360	1 960	2 180	840	5 430
All claims	Unit cost (\$)	2 200	20 000	222 400	946 000	431 300	97 200
	Total cost (\$m)	410	2 300	4 890	25 590	1 130	34 300

92. The share of costs borne by the individual and community rises sharply with severity, while the employer bears most of the cost of short-term injuries and diseases with the burden falling as severity increases (Table 2.5). The majority of economic cost associated with permanent incapacity (the highest category) is 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, 2000-01

2000 01						
	Temporary < 5 days off work	Temporary return to full duties	Temporary, reduced return	Permanent incapacity, no return	Fatality	Overall
Employers (%)	16	21	3	1	5	3
Workers (%)	4	3	55	46	51	44
Community (%)	81	77	42	53	43	53
Total (%)	100	100	100	100	100	100

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

- Employers bear 3% of the total cost this includes workers' compensation premiums, loss of productivity from absent workers, recruitment and retraining costs and fines and penalties;
- Injured workers bear 44% of the costs costs include loss of current and future income and non-compensated medical expenses; and
- The community bears 53% of the total cost this includes social welfare payments, medical and health scheme costs and loss of potential output and revenue.

94. These figures are based on an "ex-post" treatment of workers' compensation premiums paid by employers (estimated to be \$7.5billion in the 2000-01 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 \$7.5 billion cost is transferred to employers, increasing the burden borne by employers to 28 per cent reducing the burden on society to 38 per cent.

95. The actual cost borne by workers rises significantly with severity, with workers who are permanently incapacitated estimated to incur, on average, between \$200 000 and \$433 000 in economic costs (including estimates for future income lost). In contrast, workers who suffer a minor injury are estimated to incur between \$70 and \$230 in total cost (see Table 1.8). The most severe incidents account for the bulk of total costs. Outcomes involving permanent incapacity or fatality account for nearly 80 per cent of total costs from only 9 per cent total cases. Table 2.6 shows the distribution of claims and total costs by severity category and nature of incident.

		Temporary < 5 days off work	Temporary return to full duties	Temporary, reduced return	Permanent incapacity, no return	Fatality	All Incidents
Injury	Distribution of incidents (%)	56	32	4	8	0	100
	Distribution of total costs (%)	1	7	10	81	1	100
Diagona	Distribution of incidents (%)	29	34	25	6	5	100
Disease	Distribution of total costs (%)	2	7	36	40	15	100
All claims	Distribution of incidents (%)	53	33	6	8	1	100
AII CIAIMS	Distribution of total costs (%)	1	7	14	75	3	100

Table 2.6: Distribution of costs and incidents (% of total costs and total incidents) of workrelated injury and disease by severity, 2000-01

96. 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 of 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 permanent incapacity or fatality, while the cost to the community is highest for permanent incapacity.

SECTION 3. COSTS OF PAIN AND SUFFERING

97. The estimates presented in section 2 contain no direct provision for the cost to injured and ill workers from pain and suffering and early death. In previous studies, compensation payments for pain and suffering have been used as a proxy for the individual cost of pain and suffering. Based on reviews of the available literature, this appears to vastly undervalue the actual cost of pain and suffering to the individual.

98. In their review of the NOHSC methodology, Access Economics recommended an approach to estimating the cost of suffering and early death based on the 'willingness to pay' approach and the statistical value of a life year (VLY). Pain and suffering for severity categories 1 and 2 are limited to temporary effects before return to work and estimates are based on the average time off work as given in Table 1.7. Pain and suffering for severity categories 3 to 5 are based on the time period covered between the age at the time of typical incident and average life expectancy, using the present value of future life years (with a discount rate of 3.3%) to determine the total cost.

99. Based on a conservative estimate of the value of a statistical life year as \$112 500, the cost of pain and suffering and early death is estimated at \$48.5 billion¹⁵, increasing the total cost of work-related injury and disease to \$82.8 billion for the 2000-01 financial year. Table 3.1 presents the breakdown of this cost estimate by various factors such as economic agent and nature and severity of the incident.

100. This estimate should not be compared with the level of Australian GDP, which measures economic output. In addition, the methodology used to derive this estimate has a number of empirical difficulties, which mean that the estimates presented in Table 3.1 should be used as indicative figures only.

	·	Temporary < 5 days off work	Temporary return to full duties	Temporary, reduced return	Permanent, no return	Fatality	Overall cost
Employor	Injury	100	400	100	200	0	800
Employer	Disease	0	100	100	0	100	200
Worker*	Injury	0	200	10 200	35 900	1 000	47 400
	Disease	0	0	9 000	3 200	3 900	16 100
Community	Injury	300	1 500	1 400	12 600	200	16 000
	Disease	100	300	600	1 100	300	2 400
	Injury	300	2 100	11 700	48 800	1 100	64 100
All	Disease	100	400	9 700	4 300	4 300	18 700
	Total	400	2 500	21 400	53 100	5 400	82 800

Table 3.1: Total costs of work-related injury and illness (\$ million), Australia, 2000-01, including costs for pain, suffering and early death.

* Total costs for workers include \$61.9 billion for the cost of pain and suffering, but excluding the previously estimated \$22 million in workers PDC costs and \$13.3 billion in human capital costs.

Units are rounded to the nearest \$100 million

¹⁵ This value is net of the estimates of production disturbance costs and human capital costs for workers.

SECTION 4. CONCLUSION

101. Based on independent reviews of the NOHSC methodology by The Allen Consulting Group and Access Economics, and the acceptance of the previous methodology developed by the Industry Commission, the NOHSC office believes that this report outlines a reasonable, robust and conservative approach to estimating the total economic costs of work-related injury and disease to the Australian economy.

102. In particular, the work of Access of Economics identified the important themes of the analysis from relevant literature. Through this, a theoretical structure around which to classify costs was developed that allowed a more robust definition of cost items and reduced the likelihood of double counting of items.

103. The estimation process has been developed using a conservative approach to defining parameters, number of cases and inclusion of cost items. For these reasons, we believe that the estimate presented in this report is likely to underestimate the total cost of work-related injury and disease to the Australian economy.

104. The estimates and distributions presented in this section are based on the application of a number of choices of methodological approaches. The most important of these are:

- Including only "human" costs and incidents involving injury or illness to workers;
- Estimating total costs over cases originating or entering the compensation system during the current reference year only;
- Considering the cost of work-related injury and illness after they occur, in effect building the cost estimate from the "bottom-up"; and
- Considering the future costs for current reference year cases, and deflating future monetary values (income and costs) to reference year values.

105. This estimate does not attempt to measure the costs to employers of compliance with Occupational Health and Safety regulations or implementing training and other programs to prevent incidents of work-related injury or illness. The NOHSC office will explore methods to estimate these costs in a separate counterpart study to this report.

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.

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 * duration of absence in weeks * 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 * 2.5 °.
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, \$290 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 * 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.

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

^a For claims of longer duration or severity (such as permanent incapacity and fatality), the injured worker is assumed to be replaced after 8 weeks. The distribution of labour on-costs is base don 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.

 $^{\rm c}$ Training and re-training are assumed to occupy approximately 2 $\frac{1}{2}$ 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 \$12 750 and the prosecution rate is assumed to be 3% of incidents for permanent incapacity and 50% of incidents for fatalities.

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, permanently incapacitated or suffering a 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 °.
Funeral costs (ADMINC)	Real costs of bringing forward a funeral	Average funeral costs are estimated at \$3 617. 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 permanent cases only, the present value of future costs for carers.	Estimated applicable Disability Support Pension payments of \$1687 per annum, discounted to present value over the period between the incident and reduced life expectancy.
Aids and modifications (OTHERC)	For permanent cases only, the present value of future costs for aids and modifications.	Estimated applicable Disability Support Pension payments of \$530.4 per annum, discounted to present value over the period between the incident and reduced life expectancy.

Table A1.2: Definitions.	methods and	assumptions fo	r derivina kev	v inputs.	worker cost items
				,	

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 \$11 970 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.

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 though 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) [°] .			
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 permanently incapacitated workers (ADMINC)	Travel concessions and other allowances offered to permanently incapacitated workers.	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 loses				
a Based on average weekly earnings over the period of lost earnings, with an average taxation rate of 40%.					

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

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 \$10 323 p.a.) following a period of compensation (for compensated incidents).

c Workers who suffer a permanent incapacity are assumed to rely on the Commonwealth Rehabilitation Service (average cost per case is \$3 362 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% 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).

Item	Description	Estimate
Average earnings	Proxy for productivity, ABS Employee Earnings and Hours survey (ABS Cat. No. 6306.0), May 2000. Average weekly total earnings, persons, all employees.	\$625 pw \$652 pw + overtime
Discount rate	Opportunity cost of money: Average of rates of return for private and government saving instruments and RBA target for January 1993 to June 2003.	5.8% p.a.
Inflation rate	Average of annual weighted ABS Consumer Price Index (CPI), March 1993 to June 2003	2.5% p.a.
Productivity rate	Annual increase in worker productivity. Commonwealth Government Intergenerational Report.	1.75% p.a.
Bulk-billing rate	Proportion of consultations that are bulk-billed (source: DoHA Medicare statistics)	68.9% of cases
Private Health Insurance take-up	Private Health Insurance Administration Commission (PHIAC) estimates of coverage of health insurance, September 2001	44.4% of cases
Reduced life expectancy for	AIHW Healthy Life Expectancy (HALE) (Source: AIHW Mortality, Life Expectancy,	73 years
permanent incapacities Retirement age	www.ainw.gov.au/mortailty/data/life_expectancy.ntml) Median retirement age of older Australians (Source: ABS Retirement and Retirement Intentions, November 1997, ABS Catalogue 6238.0)	62 years
Average time to settlement of claims	Average of weighted average of expected term to settlement (Workers' compensation jurisdiction annual reports, 2000-01)	4 years
rate	average weekly earnings (Source: ABS Average Weekly Earnings May 2002 ABS Catalogue from 0)	4.4%
Medical costs ^a	Total medical costs per claim: 72% of goods and services payments per claim, by severity and nature (NDS)	Dependent on severity category (Table A2.6)
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 A2.6)
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 A2.6)

a See table 1.5 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- 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 all employees estimates, 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.

		· · · ·				
		Temporary	Temporary	Temporary,	Permanent	
Unit		< 5 days off	return to full	reduced	incapacity,	Fatality
		work	duties	return	no return	
Weeks	Injury	0.4	4.6	44.1	37.1	17.7
	Disease	0.4	6.4	21.4	42.7	70.4
	Injury	33	35	41	37	37
Years						
	Disease	37	39	42	46	51
	Injury	\$259	\$1 347	\$7 394	\$9 667	\$2 252
\$/claim						
	Disease	\$428	\$1 700	\$3 003	\$8 052	\$1 101
\$/incident		\$28	\$527	\$832	\$2 374	\$2 840
	Injury	\$3	\$24	\$472	\$11 232	\$366
\$/claim						
¢/ olalini	Discaso	¢3	¢53	¢308	\$10,500	\$221
	Disease	φο	4 00	\$ 320	\$10,000	φ32 I
%	All claims	66%	30%	17%	12%	6%
	Unit Weeks Years \$/claim \$/incident \$/claim	Unit Unit Weeks Injury Years S/claim S/claim S/claim Injury S/claim Injury Disease Injury Disease All claims	UnitTemporary < 5 days off workUnit< 5 days off workWeeksInjury0.4Disease0.4Injury33YearsDisease37Joisease37Injury\$259\$/claimDisease\$428\$/incident\$28\$/claimDisease\$3%All claims66%	UnitTemporary < 5 days off workTemporary return to full dutiesWeeksInjury0.44.6Disease0.46.4Injury3335YearsDisease3739Joisease3739Injury\$259\$1 347\$/claimDisease\$428\$1 700\$/incident\$28\$527\$/claimDisease\$3\$53%All claims66%30%	Unit Temporary 5 days off work Temporary return to full duties Temporary reduced return Weeks Injury 0.4 4.6 44.1 Weeks Disease 0.4 6.4 21.4 Injury 33 35 41 Years Disease 37 39 42 Injury \$259 \$1 347 \$7 394 \$/claim Disease \$428 \$1 700 \$3 003 \$/incident \$28 \$527 \$832 \$/incident \$28 \$527 \$832 \$/claim Disease \$3 \$24 \$472 \$/claim Disease \$3 \$53 \$328 % All claims 66% 30% 17%	Unit Temporary 5 days off work Temporary return to full duties Temporary, reduced return Permanent incapacity, no return Weeks Injury 0.4 4.6 44.1 37.1 Weeks Disease 0.4 6.4 21.4 42.7 Injury 33 35 41 37 Years Disease 37 39 42 46 Injury \$259 \$1 347 \$7 394 \$9 667 \$/claim Disease \$428 \$1 700 \$3 003 \$8 052 \$/incident \$28 \$527 \$832 \$2 374 \$/claim Injury \$3 \$24 \$472 \$11 232 \$/claim Disease \$3 \$53 \$328 \$10 500 % All claims 66% 30% 17% 12%

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

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 17 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.	Table A1.6: Summary of cost estimates for injury and illness, \$m, 2000-01							
Total Costs	Total		Employe	r	Worke	r	Society	
			Value of production	340			Welfare payments	250
			Employer excess	100			Tax revenue forgone	30
Production disturbance costs			Sick leave	50			Compensation payments ^b	390
(PDC)	Value of production	1 180	VOP(E)	490		-	VOP(S)	670
	Staff turnover	90	Staff turnover	90		-		-
	PDC	1 270	PDC(E)	570	PDC(W) ^a	20	PDC(S)	670
							Welfare payments	4 760
Human Capital							Tax revenue forgone	4 010
							Compensation payments ^b	5 150
	нкс	27 240	HKC(E)	-	HKC(W) [°]	13 330	HKC(S) [°]	13 910
Medical costs					Gap/Private	40	Medical	550
(MEDC)					Rehabilitation	-	Rehabilitation	1 290
	MEDC	1 900		60		40		1 840
			Legal costs	220	Legal costs	60	Legal costs	160
			Penallies	10			Penallies Deadwoight loss	-10
		440	Legal costs	230	Legal costs	60		150
Administration	Investigation	440	Investigation	200	Legal Costs	00	Investigation	150
costs (ADMINC)	costs	520	costs	130			costs	390
	Travel costs	410			Travel costs	350	Travel costs	60
	Funeral costs	10			Funeral costs	10	Funeral costs	10
	ADMINC	1 380	ADMINC(E)	360	ADMINC(W)	410	ADMINC(S)	600
							Welfare	250
Transfer costs							deadweight loss	
(TRANSC)							lax deadweight	1 070
	TRANSC	1 320					TRANSC(S)	1 320
	Invitoo	1020			Carer costs	940		1020
Other costs					Aids and			
(OTHERC)					modifications	300		
	OTHERC	1 240		-	OTHERC(W)	1 240		-
Subtotal ^d		34 370		990		15 040		18 340
Suffering and early death (SUFFC)	SUFFC °	48 490		-	SUFFC(W) °	48 490		-
TOTAL (including SUFFC) ^e		82 860		990		63 530		18 340
Figures are rounded	to the nearest \$10	million						

a PDC(W) = PDC - [PDC(E) + PDC(S)]

b Total compensation payments are estimated at \$5.53 billion, of which \$39 million are short term (the period up to return to work or replacement) and \$5.15 billion are long term payments (following return to work or replacement).

c HKC(S) = Weflare(S) + Tax(S) + CompPay(S) => HKC(W) = HKC - HKC(S) d Subtotal = PDC + HKC + MEDC + ADMINC + TRANSC + OTHERC

e SUFFC(W) = Total suffering and early death estimate - [PDC(W) + HKC(W)]

f TOTAL = PDC + HKC + MEDC + ADMINC + TRANSC + OTHERC + SUFFC

APPENDIX 2. ECONOMIC COSTS BY JURISIDCTION

Table 2.3a in Section 2 shows a summary of total and unit costs by jurisdiction. 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 jurisdiction for the economic agents included in the model and the major conceptual groups from Table 1.1.

Ca	ategory	New South Wales	Victoria	Queensland	Western Aust.	South Aust.	ACT	Tasma nia	Northern Territory	Australia
Foonomio	Employers	420	180	170	80	80	30	20	10	990
agent	Workers	6 510	2 670	2 740	1 130	1 150	590	250	130	14 950
agent	Society	8 120	3 210	2 720	1 580	1 490	610	410	180	18 330
	Production disturbance	540	230	210	110	100	40	30	10	1 260
Concentual	Human capital	12 080	4 800	4 440	2 190	2 140	1 010	530	250	27 200
conceptual	Medical	790	340	340	170	160	60	40	20	1 930
calegoly	Administration	610	240	210	120	110	50	30	10	1 380
	Transfer	540	240	230	120	110	40	30	10	1 320
	Other Costs	490	210	200	100	100	40	30	10	1 180
	Temporary <5 days	200	70	50	40	40	10	10	-	420
Severity category	Temporary, full return to duties	1 110	390	270	190	180	80	50	20	2 300
	Temporary, reduced return to duties	2 290	860	690	360	430	190	100	50	4 890
	Permanent	11 150	4 520	4 360	2 100	2 000	930	500	240	25 600
	Fatal	390	240	240	110	90	30	30	10	1 140
	Total	15 140	6 060	5 630	2 810	2 720	1 240	690	310	34 300
Units are rounded to the nearest \$10 million										

Table A2.1: Cost of work-related injury and illness for Australian jurisdictions, by economic agent, conceptual cost category and severity category (\$ 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 80 per cent of total costs are categorised as human capital costs.

The relative cost borne by workers and society shows more variance between jurisdictions, from a low of 37 per cent borne by workers in Tasmania to a high of 48 per cent in Queensland and the Australian Capital Territory.

Queensland and the Australian Capital Territory also show a higher percentage of costs for fatal incidents (4.3 per cent of total costs) than other jurisdiction (the Australian average is 3.3 per cent). In the case of Queensland, this is offset by a lower contribution of costs for temporary cases, whereas for the ACT permanent cases contribute less than the Australian average to total costs.

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 Tax revenue forgone 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.

Parameter	Baseline estimate in		Lower bound	Upper bound
	study			
Ordinary time earnings	ABS AWOTE	\$625.0 / wk	\$563 pw (Adult non-managerial earnings_ABS_6306.0)	\$799.3 pw (Adult full time ordinary time earnings ABS 6206 0)
Total earnings	ABS AWE Average investment rates.	\$652.8 / wk	\$594.2 / wk (as above) 4.98%	\$821 / wk (as above)
Savings rate	January 1993-2001 (RBA Bulletin) Average quarterly CPI	5.8% pa	(Average investments rates, Jan 1999-2001) 3 27%	(Average investment rates, January 1990-2001) 2 80%
Inflation rate	growth, March 1993-2003 (ABS	2.5% pa	(Average CPI growth March 1996-2003)	(Average CPI growth March 1986-2003)
Discount rate	Savings – inflation	3.30% pa	(Period 1999-2003)	3.27% (Period 1990-2003)
Retirement age	Median age of retirement, ABS 6238.0	62 years	n/a	67 years
Reduced life expectancy Medical costs of	Healthy life expectancy (AIHW)	73 years	70 years	75 years
uncompensated		100%	75%	n/a
Level of earnings following return to work		64%	50%	75%
Average tax rate for forgone revenue		40%	25%	50%
Non-compensated disease fatalities	NOHSC estimate of total work-related disease fatalities	2 087	0 (NDS data only)	7 487 (NOHSC office estimate of upper bound for work-related disease fatalities)
Definition of total cases	NOHSC (NDS and ABS 6324.0)	353 020 cases	n/a	349 706 (Access recommendation)

Table A3.1: Parameter estimates

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 \$32 billion and \$41 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 earnings and the discount rate used for present value calculations.

The discount rate in these calculations is calculated by subtracting the inflation rate from the savings rate. The productivity rate (which is not varied in this analysis) 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 **\$34.3 billion** baseline estimate lies further towards the lower end of the estimated range.

Table A5.2. Cost estima	te ranges for selected p	arameter changes	
Parameter	Parameter range (baseline parameter)	Lower bound for total costs (\$ million)	Upper bound for total costs (\$ million)
Ordinary time and total earnings	\$563-799 pw (\$625) \$594-821 pw (\$653)	31 940	41 580
Discount rate	1.73% - 4.00% pa (3.30% pa)	32 370	40 020
Retirement age	67 years (62 years)	n/a	39 280
Reduced life expectancy	70 - 75 years (73 years)	34 410	34 450
Medical costs of uncompensated cases	75% - 100% (100%)	34 410	34 430
Level of earnings following return to work	50%-75% (64%)	32 790	36 520
Average tax rate for forgone revenue	25%-50% (40%)	34 040	34 690
Non-compensated disease fatalities	0-7 487 (2 087)	33 500	36 800
Definition of total cases ^a	349 706 (353 020)	n/a	36 210

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

a This change modifies the distribution of cases, specifically increasing the number of disease cases. Even though the number of cases has decreased, the increase in the number of disease cases will have the effect of increasing the total cost.

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