

The Social Cost of Road Crashes and Injuries

June 2011 update

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Overview

This is an annual update of the Social Cost of Road Crashes and Injuries published by the Ministry of Transport.

This update provides estimates of the average social costs per injury and per crash, after accounting for inflationary effects and any changes in the levels of non-reporting. It also accounts for any changes in the mix of crashes by area and severity, and the average number of injuries received in a crash. The analysis is based on crash and injury data from 2008 to 2010. Unless otherwise indicated, all social cost estimates are expressed in June 2011 prices.

Estimation of injury and crash costs

The social cost of a road crash or a road injury is defined as the total cost that occurs as a result of the road crash or injury. Its value depends on the number of cost components estimated and the estimation methods adopted.

In New Zealand, the social cost of a road crash or a road injury includes the following components:

- loss of life and life quality
- loss of output due to temporary incapacitation
- medical costs
- legal costs
- property damage costs

Most of these social cost components are either measurable or can be estimated in dollar terms. A 'willingness-to-pay' valuation technique is used to express pain and suffering from loss of life or life quality in dollar terms¹. Various methodologies have been developed to estimate the value of other social cost components. For a detailed discussion of the methodology, please refer to previous issues of The Social Cost of Road Crashes and Injuries update.

Estimation of the social cost of road crashes and injuries requires two stages of analysis. The first stage involves estimating the total number of crashes and injuries, because not all crashes are reported and recorded in the official Traffic Crash Reports (TCRs). Hospitalisation data and Accident Compensation Corporation's motor vehicle claims data are used in conjunction with TCRs to obtain the best estimates of the total numbers of road crashes and injuries. The estimated total numbers of crashes and injuries for the years 2008 to 2010 are given in Table 10.

The second stage involves calculating the impacts in monetary terms, taking into account the non-reported incidents. The average social cost obtained after adjusting for the level of non-reporting is referred to as the average social cost per reported incident. The price indices used in updating the social cost components are included in Table 11.

All updated estimates are incorporated into the Ministry's Crash Analysis System and in the NZ Transport Agency's Economic Evaluation Manual to facilitate consistent appraisal of the safety benefits from the prevention of road crashes and injuries.

¹ This is the willingness-to-pay based value of statistical life

Average social cost per injury and per crash

The updated value of statistical life is \$3.67 million per fatality, at June 2011 prices. This gives an updated average social cost per fatality of \$3,693,000. For non-fatal injuries, the updated average social cost is estimated at \$390,400 per serious injury and \$20,700 per minor injury. These estimates do not include an adjustment for the level of non-reporting.

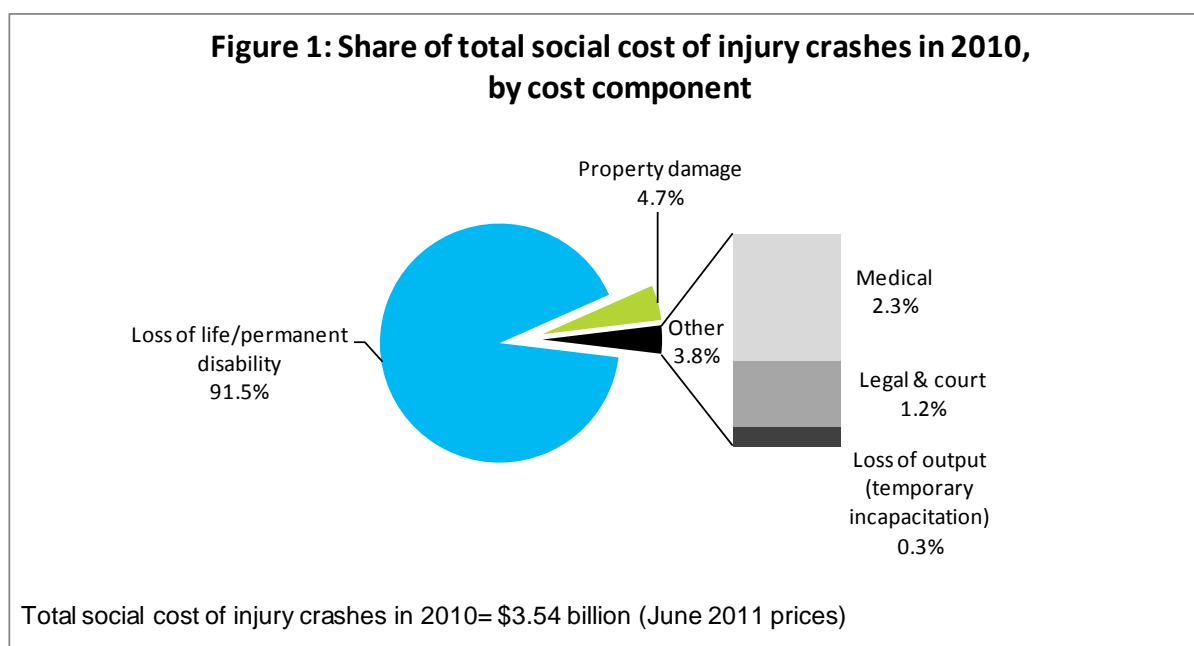
Apart from fatalities, not all serious and minor injuries are reported. With an adjustment for the level of non-reporting, the social cost estimates increase to \$625,000 per reported serious injury and \$61,000 per reported minor injury.

In per-crash terms, the updated average social cost is estimated at \$4,322,000 per fatal crash, \$455,500 per serious crash, \$26,000 per minor crash (or \$749,000 per reported serious crash and \$80,000 per reported minor crash, after adjusting for the level of non-reporting). Because each crash can result in multiple injuries of various injury severities, the average social cost per crash is higher than the average social cost per injury in all cases.

Total social cost of road injury crashes in 2010

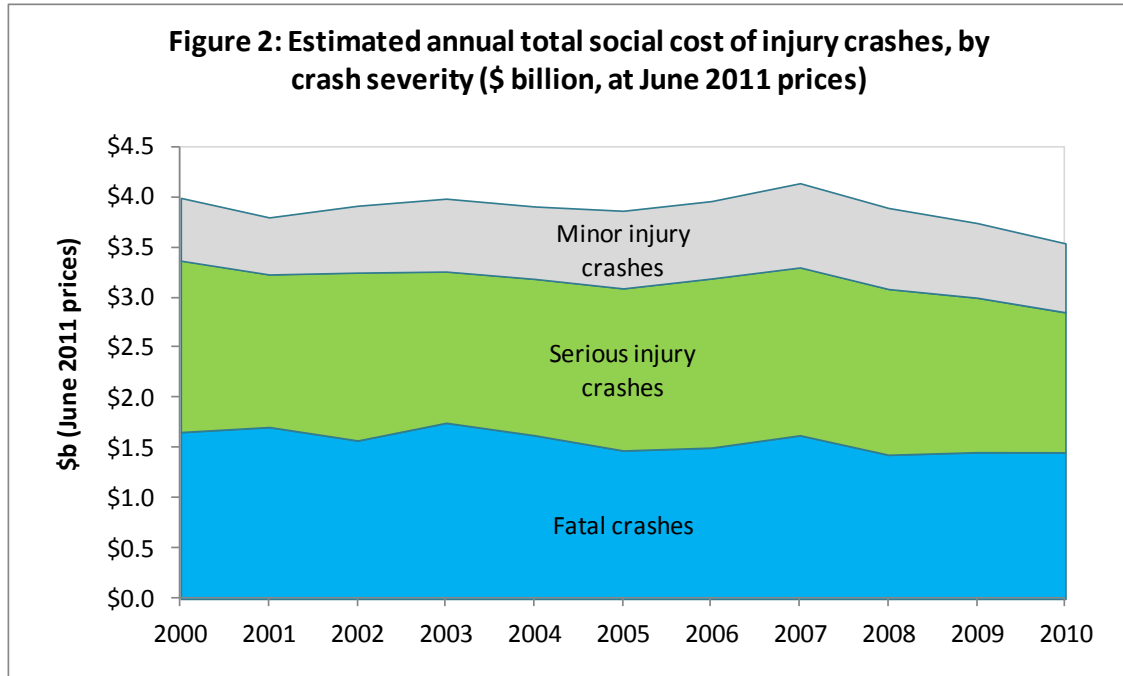
The total social cost of motor vehicle injury crashes in 2010 is estimated at approximately \$3.54 billion (down from \$3.74 billion in 2009), at June 2011 prices. Figure 1 shows loss of life and/or life quality due to permanent impairments accounted for approximately 91 percent of the total social cost of injury crashes. Property damage accounted for around five percent, and other cost components made up the remaining four percent.

In addition, there are an estimated 223,700 property damage only crashes, valued at a further \$0.61 billion. Therefore, the total social cost of all motor vehicle crashes is estimated to have been \$4.15 billion (down from \$4.37 billion in 2009). These estimates include both reported and non-reported cases.



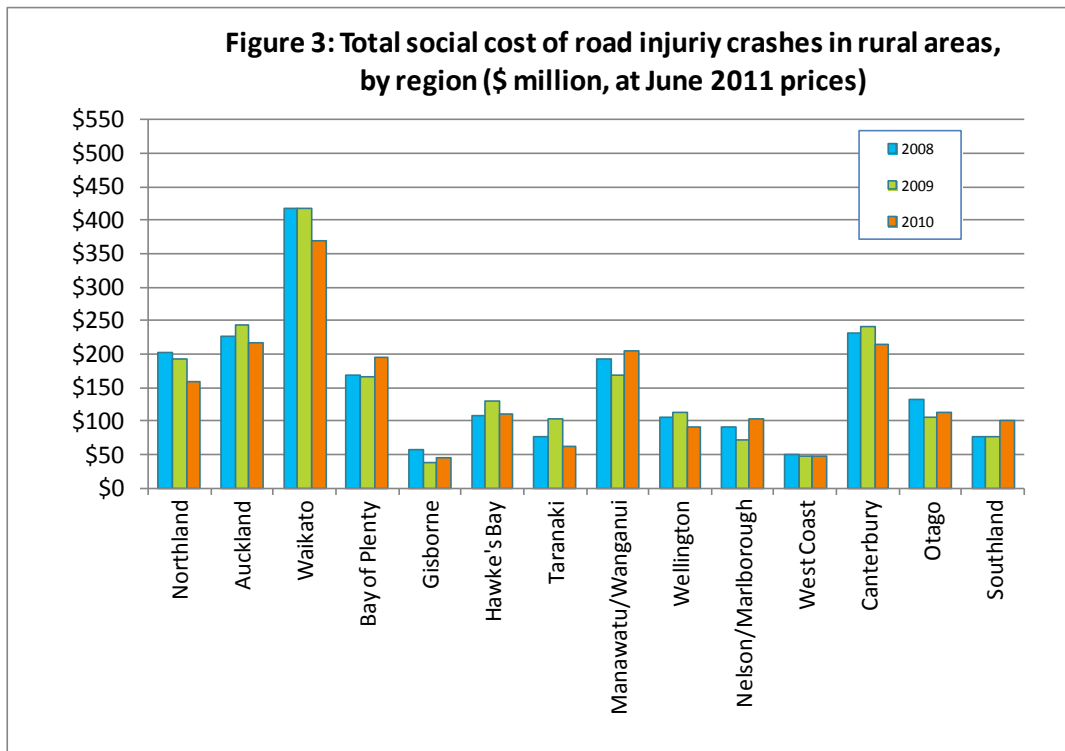
Annual total social cost of road crashes for the years from 2000 to 2010

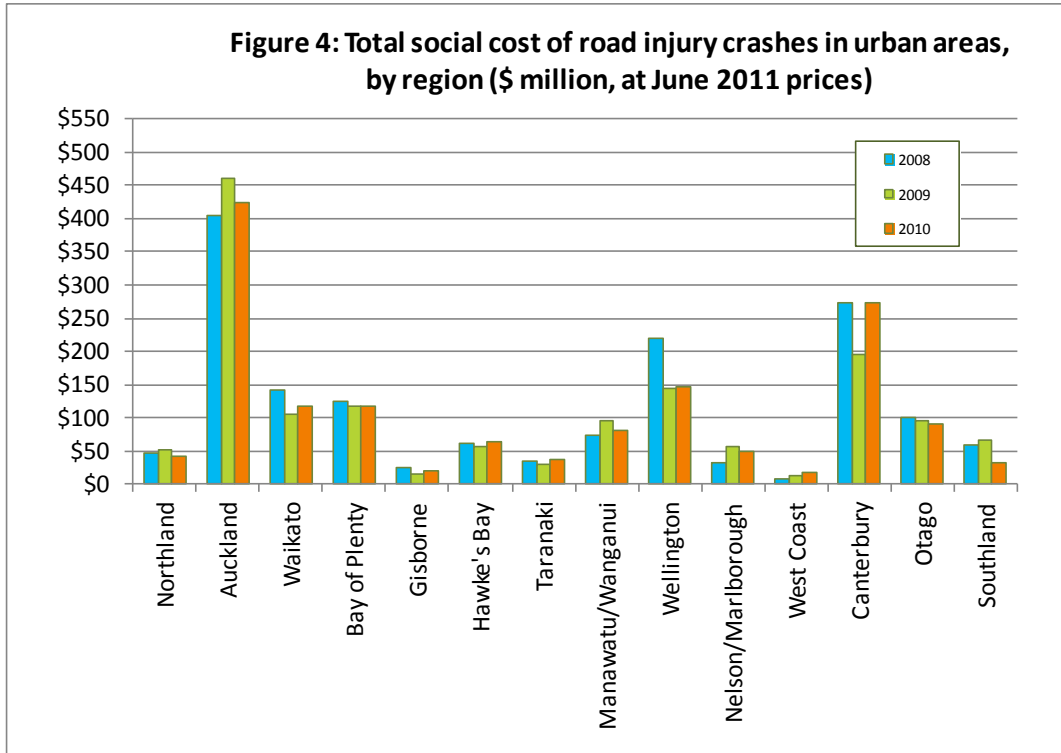
Figure 2 shows the trend of the estimated annual total social cost of injury crashes for the years from 2000 to 2010.



Note: This chart includes allowances for non-reported cases.

On average, around 57 percent of the total social cost of road injury crashes relates to crashes that occurred in rural areas. The regional distributions by area are plotted in Figures 3 and 4.





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1 Average social cost by cost component

Tables 1 and 2 provide the estimates of average social costs per crash and per injury, including breakdowns by cost component. Table 3 provides the estimates of average social costs per property damage only crash by area. These estimates do not include adjustment for under reporting and are suitable only for cases where we know the total number of crashes and injuries.

Table 1: Average social cost per crash, by cost component

Cost components	Crash type		
	Fatal	Serious	Minor
	June 2011 prices (\$)		
Loss of life/permanent disability	4,277,800	425,700	18,400
Loss of output (temporary disability)	700	1,600	300
Medical –			
Hospital/medical	8,000	10,000	200
Emergency/pre-hospital	3,900	1,500	800
Follow-on	2,000	4,900	100
Legal and court	18,900	5,000	800
Property damage	10,700	6,700	5,400
Total	4,322,000	455,500	26,000

Notes:

1. Figures may not sum to totals due to rounding.
2. These estimates have not been adjusted for the level of non-reporting.

Table 2: Average social cost per injury, by cost component

Cost components	Injury type		
	Fatal	Serious	Minor
	June 2011 prices (\$)		
Loss of life/permanent disability	3,665,700	366,600	14,700
Loss of output (temporary disability)	0	1,300	200
Medical –			
Hospital/medical	3,500	8,700	100
Emergency/pre-hospital	2,800	1,000	600
Follow-on	0	4,300	100
Legal and court	14,900	4,200	600
Property damage	5,800	4,300	4,300
Total	3,692,800	390,400	20,700

Notes:

1. Figures may not sum to totals due to rounding.
2. These estimates have not been adjusted for the level of non-reporting.

Table 3: Average social cost per property damage only crash

Per PDO crash (Note)	June 2011 prices (\$)		
	All areas	Rural	Urban
Property damage only	2,700	3,000	2,600

Note: These estimates have not been adjusted for the level of non-reporting.

2 Average social cost per reported incident, by severity

Tables 4 to 6 provide the estimates of average social costs per reported crash and per reported injury, after adjusting for the level of non-reporting. These tables include estimates for a combination of crash or injury types: fatal and serious, serious and minor, and all three. These estimates are useful for assessing safety risks that could cause severe injury to road users but have a low probability of occurrence (eg in situations where the crash or injury numbers are small). If a programme is expected to reduce the number of injuries, but not the number of crashes, use the estimates from Table 6. Otherwise, use the estimates from Tables 4 and 5, depending on data availability and the purpose of the analysis.

Table 4: Average social cost per reported crash, by severity

Crash severity	June 2011 prices (\$)		
	All	Rural	Urban
Fatal	4,322,000	4,384,000	4,160,000
Serious	749,000	802,000	699,000
Minor	80,000	85,000	77,000
Serious and minor	201,000	247,000	172,000
Fatal and serious	1,267,000	1,533,000	986,000
Fatal, serious and minor	324,000	474,000	226,000

Table 5: Average social cost per reported injury, by severity

Injury severity	June 2011 prices (\$)		
	All	Rural	Urban
Fatal	3,693,000	3,693,000	3,693,000
Serious	625,000	630,000	619,000
Minor	61,000	60,000	61,000
Serious and minor	154,000	176,000	138,000
Fatal and serious	1,037,000	1,181,000	864,000
Fatal, serious and minor	243,000	326,000	181,000

Table 6: Average social cost per reported injury, excluding associated property damage costs, by severity

Injury severity	June 2011 prices (\$)		
	All	Rural	Urban
Fatal	3,687,000	3,687,000	3,687,000
Serious	618,000	623,000	613,000
Minor	48,000	47,000	49,000
Serious and minor	143,000	164,000	127,000
Fatal and serious	1,031,000	1,173,000	858,000
Fatal, serious and minor	231,000	314,000	169,000

3 Average social cost per reported injury crash, by vehicle movement

Table 7 provides estimates of the average social cost per reported crash by vehicle movement, using crash data from 2006 to 2010. These estimates have been adjusted for the level of non-reporting and are suitable for analysing policies or programmes that focus on specific vehicle movement classifications (eg head-on crashes).

Table 7: Average social cost per reported injury crash (fatal, serious and minor), by vehicle movement

Vehicle movement classification	June 2011 prices (\$)		
	All	Rural	Urban
Overtaking or lane change	434,000	518,000	313,000
Head-on, not overtaking	882,000	1,195,000	376,000
Lost control, straight roads	339,000	365,000	301,000
Cornering	379,000	418,000	303,000
Collision with obstruction	219,000	313,000	183,000
Rear-end collision	143,000	179,000	119,000
Turning versus same direction	208,000	345,000	147,000
Crossing, no turns	248,000	573,000	205,000
Crossing, vehicle turning	232,000	484,000	165,000
Vehicles merging	181,000	282,000	164,000
Right turn against	230,000	437,000	194,000
Vehicle manoeuvring	224,000	442,000	186,000
Pedestrian crossing road	317,000	1,089,000	291,000
Pedestrian other	565,000	1,406,000	398,000
Miscellaneous	616,000	702,000	540,000

4 Average social cost by local government region

Due to differences in physical locations, sizes of regions, the availability of facilities, and for other reasons, the proportions of injury crashes that are reported to the police differ across regions. The mix of rural and urban crashes also differs across regions. As a result, there are regional variations in the average social costs per reported injury and per crash.

Tables 8 and 9 provide the regional average social costs per reported crash and per reported injury respectively, using crash data from 2008 to 2010. These estimates have been adjusted for the level of non-reporting and are useful for the evaluation of regional programmes or policies.

Table 8: Average social cost per reported injury crash, by local government region

Region	Crash severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious and minor
June 2011 prices (\$)						
All areas						
Northland	4,228,000	999,000	82,000	274,000	1,708,000	493,000
Auckland	4,182,000	563,000	78,000	138,000	992,000	204,000
Waikato	4,543,000	650,000	83,000	194,000	1,441,000	400,000
Bay of Plenty	4,345,000	1,087,000	80,000	313,000	1,657,000	501,000
Gisborne	5,106,000	1,513,000	82,000	317,000	2,204,000	498,000
Hawke's Bay	4,454,000	854,000	78,000	235,000	1,359,000	370,000
Taranaki	4,054,000	972,000	81,000	248,000	1,499,000	390,000
Manawatu-Wanganui	4,386,000	696,000	79,000	217,000	1,414,000	430,000
Wellington	4,252,000	838,000	75,000	199,000	1,127,000	259,000
Nelson-Marlborough	4,156,000	750,000	79,000	224,000	1,353,000	399,000
West Coast	4,212,000	773,000	83,000	259,000	1,323,000	443,000
Canterbury	4,243,000	734,000	80,000	227,000	1,119,000	336,000
Otago	4,088,000	631,000	85,000	199,000	949,000	278,000
Southland	4,443,000	829,000	85,000	237,000	1,329,000	370,000
New Zealand	4,322,000	749,000	80,000	201,000	1,267,000	324,000

Table 8 continued

Region	Average social cost per reported crash June 2011 prices (\$)					
	Fatal	Serious	Crash severity		Fatal and serious	Fatal, serious and minor
			Minor	Serious and minor		
Rural areas						
Northland	4,171,000	1,010,000	87,000	297,000	1,829,000	583,000
Auckland	4,282,000	592,000	82,000	146,000	1,315,000	269,000
Waikato	4,603,000	675,000	87,000	220,000	1,665,000	531,000
Bay of Plenty	4,371,000	1,165,000	86,000	382,000	1,870,000	669,000
Gisborne	5,150,000	1,504,000	90,000	428,000	2,505,000	819,000
Hawke's Bay	4,686,000	893,000	85,000	312,000	1,525,000	544,000
Taranaki	4,090,000	1,002,000	87,000	299,000	1,749,000	561,000
Manawatu-Wanganui	4,423,000	728,000	84,000	262,000	1,567,000	574,000
Wellington	4,625,000	870,000	82,000	240,000	1,395,000	378,000
Nelson-Marlborough	4,063,000	781,000	86,000	278,000	1,406,000	509,000
West Coast	4,310,000	730,000	85,000	267,000	1,327,000	482,000
Canterbury	4,178,000	793,000	86,000	292,000	1,396,000	523,000
Otago	4,184,000	640,000	90,000	221,000	1,144,000	372,000
Southland	4,444,000	851,000	85,000	279,000	1,371,000	450,000
New Zealand	4,384,000	802,000	85,000	247,000	1,533,000	474,000
Urban areas						
Northland	4,730,000	970,000	75,000	229,000	1,324,000	307,000
Auckland	4,091,000	552,000	76,000	135,000	861,000	181,000
Waikato	4,152,000	603,000	79,000	160,000	923,000	221,000
Bay of Plenty	4,288,000	1,003,000	76,000	259,000	1,400,000	366,000
Gisborne	4,494,000	1,526,000	77,000	242,000	1,636,000	261,000
Hawke's Bay	3,796,000	795,000	73,000	176,000	1,085,000	231,000
Taranaki	3,693,000	930,000	76,000	202,000	1,050,000	225,000
Manawatu-Wanganui	4,266,000	643,000	75,000	172,000	1,125,000	275,000
Wellington	3,791,000	823,000	73,000	185,000	992,000	217,000
Nelson-Marlborough	4,386,000	691,000	73,000	168,000	1,250,000	280,000
West Coast	3,693,000	948,000	79,000	242,000	1,306,000	336,000
Canterbury	4,383,000	697,000	77,000	199,000	921,000	252,000
Otago	3,774,000	623,000	83,000	183,000	758,000	213,000
Southland	4,442,000	793,000	85,000	194,000	1,259,000	288,000
New Zealand	4,160,000	699,000	77,000	172,000	986,000	226,000

Table 9: Average social cost per reported injury, by local government region

Region	Fatal	Serious	Injury severity		Fatal and serious	Fatal, serious and minor
			Minor	Serious and minor		
June 2011 prices (\$)						
All areas						
Northland	3,693,000	816,000	61,000	198,000	1,390,000	350,000
Auckland	3,693,000	479,000	61,000	110,000	829,000	160,000
Waikato	3,693,000	521,000	60,000	144,000	1,106,000	283,000
Bay of Plenty	3,693,000	890,000	61,000	236,000	1,338,000	370,000
Gisborne	3,693,000	1,086,000	63,000	238,000	1,532,000	356,000
Hawke's Bay	3,693,000	691,000	61,000	183,000	1,070,000	278,000
Taranaki	3,693,000	803,000	61,000	186,000	1,243,000	288,000
Manawatu-Wanganui	3,693,000	570,000	59,000	165,000	1,120,000	314,000
Wellington	3,693,000	736,000	62,000	162,000	980,000	209,000
Nelson-Marlborough	3,693,000	633,000	61,000	176,000	1,111,000	303,000
West Coast	3,693,000	594,000	60,000	187,000	1,020,000	314,000
Canterbury	3,693,000	640,000	61,000	176,000	964,000	257,000
Otago	3,693,000	531,000	60,000	142,000	793,000	197,000
Southland	3,693,000	671,000	60,000	166,000	1,057,000	254,000
New Zealand	3,693,000	625,000	61,000	154,000	1,037,000	243,000
Rural areas						
Northland	3,693,000	807,000	61,000	208,000	1,463,000	399,000
Auckland	3,693,000	475,000	61,000	110,000	1,024,000	196,000
Waikato	3,693,000	517,000	59,000	155,000	1,217,000	353,000
Bay of Plenty	3,693,000	875,000	61,000	261,000	1,404,000	446,000
Gisborne	3,693,000	1,030,000	63,000	285,000	1,661,000	513,000
Hawke's Bay	3,693,000	679,000	60,000	219,000	1,118,000	365,000
Taranaki	3,693,000	787,000	61,000	207,000	1,391,000	381,000
Manawatu-Wanganui	3,693,000	569,000	58,000	182,000	1,198,000	385,000
Wellington	3,693,000	721,000	61,000	178,000	1,127,000	274,000
Nelson-Marlborough	3,693,000	628,000	61,000	202,000	1,105,000	355,000
West Coast	3,693,000	591,000	60,000	192,000	1,061,000	340,000
Canterbury	3,693,000	633,000	60,000	206,000	1,109,000	362,000
Otago	3,693,000	527,000	59,000	150,000	929,000	248,000
Southland	3,693,000	666,000	59,000	190,000	1,054,000	297,000
New Zealand	3,693,000	630,000	60,000	176,000	1,181,000	326,000

Table 9 continued

Urban areas	Average social cost per reported injury					
	June 2011 prices (\$)					
Region	Fatal	Serious	Injury severity		Fatal and serious	Fatal, serious and minor
			Minor	Serious and minor		
Northland	3,693,000	843,000	61,000	177,000	1,137,000	236,000
Auckland	3,693,000	480,000	61,000	109,000	742,000	145,000
Waikato	3,693,000	530,000	61,000	126,000	800,000	172,000
Bay of Plenty	3,693,000	908,000	62,000	213,000	1,245,000	296,000
Gisborne	3,693,000	1,182,000	63,000	196,000	1,254,000	208,000
Hawke's Bay	3,693,000	712,000	62,000	148,000	973,000	192,000
Taranaki	3,693,000	829,000	62,000	163,000	942,000	182,000
Manawatu-Wanganui	3,693,000	571,000	61,000	143,000	958,000	222,000
Wellington	3,693,000	743,000	62,000	155,000	897,000	182,000
Nelson-Marlborough	3,693,000	644,000	62,000	144,000	1,125,000	236,000
West Coast	3,693,000	604,000	61,000	175,000	877,000	245,000
Canterbury	3,693,000	646,000	61,000	161,000	844,000	202,000
Otago	3,693,000	534,000	61,000	135,000	651,000	157,000
Southland	3,693,000	679,000	61,000	141,000	1,063,000	206,000
New Zealand	3,693,000	619,000	61,000	138,000	864,000	181,000

5 Crash statistics and price indices

Table 10: Reported and estimated number of crashes and injuries from 2008 to 2010

All areas								
	Reported	Reported injuries			Estimated	Estimated injuries		
	crashes	Fatal	Serious	Minor	crashes	Fatal	Serious	Minor
Fatal	1,005	1,125	459	479	1,005	1,125	459	479
Serious	5,918	0	6,786	2,433	9,727	0	11,138	3,979
Minor	26,735	0	0	33,589	81,949	0	0	102,961
Total	33,658	1,125	7,245	36,501	92,681	1,125	11,597	107,419
Rural areas								
	Reported	Reported injuries			Estimated	Estimated injuries		
	crashes	Fatal	Serious	Minor	crashes	Fatal	Serious	Minor
Fatal	727	822	368	380	727	822	368	380
Serious	2,834	0	3,384	1,508	4,773	0	5,689	2,510
Minor	9,707	0	0	12,849	29,753	0	0	39,387
Total	13,268	822	3,752	14,737	35,253	822	6,057	42,277
Urban areas								
	Reported	Reported injuries			Estimated	Estimated injuries		
	crashes	Fatal	Serious	Minor	crashes	Fatal	Serious	Minor
Fatal	278	303	91	99	278	303	91	99
Serious	3,084	0	3,402	925	4,954	0	5,449	1,469
Minor	17,028	0	0	20,740	52,196	0	0	63,574
Total	20,390	303	3,493	21,764	57,428	303	5,540	65,142

Table 11: Price indices for updating unit costs

Cost components	Indices/measures	Infoshare table references	Period	Indices/values	% change over the 12 months to June 2011
Loss of life and life quality	Average hourly earnings (ordinary time)	QEX001AA	June 2010	\$25.45	3.0%
Loss of output			June 2011	\$26.21	
Medical cost	Producers price input index – Health and community services	PPI012AA (Base: Dec 1997=1000)	June 2010 June 2011	1318 1343	1.9%
Legal and court cost	Producers price input index – Legal services: Personal and Corporate	PPI018AA (Base: Dec 2010=1000)	June 2010 June 2011	996 1018	2.2%
Property damage cost	Consumers price index – Vehicle servicing & repairs	CPI013AA (Base: June 2006 =1000)	June 2010 June 2011	1175 1221	3.9%

Source: Infoshare, Statistics New Zealand. R – revised.