

Social Cost of Road Crashes and Injuries

June 2012 update

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ISSN 1173-1370

ANNUAL UPDATE
NOVEMBER 2012



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 2009 to 2011. Unless otherwise indicated, all social cost estimates are expressed in June 2012 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 components¹ 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
- vehicle 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 terms (ie the willingness-to-pay based value of statistical life or VOSL). 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 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 2009 to 2011 are given in Table 10. For the three years to 2011, only 62 percent of all serious injuries and 33 percent of all minor injuries are recorded in TCRs.

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 NZ Transport Agency's Crash Analysis System and their Economic Evaluation Manual to facilitate consistent appraisal of the safety benefits from the prevention of road crashes and injuries.

¹ The social cost estimates do not include transfer payments such as taxes or insurance premiums. Current estimates also exclude the costs associated with insurance administration, traffic delays due to road crashes and collateral damages (other than vehicle damages). While these costs can be very high in some specific cases, they are unlikely to materially affect the average cost estimates obtained at the aggregated level.

Average social cost per injury and per crash

The updated value of statistical life is \$3.77 million per fatality, at June 2012 prices. This gives an updated average social cost per fatality of \$3,797,600. For non-fatal injuries, the updated average social cost is estimated at \$401,100 per serious injury and \$21,300 per minor injury. These estimates do not include an adjustment for the level of non-reporting.

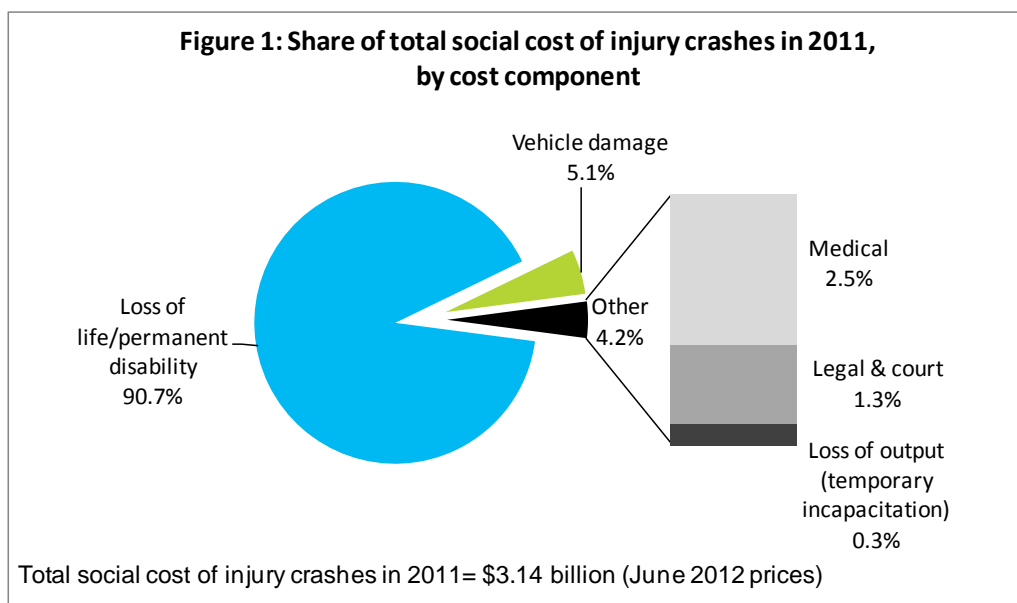
Apart from fatalities, not all serious and minor injuries are reported. With an adjustment for the level of non-reporting, the social cost estimates increase to \$645,000 per reported serious injury and \$65,000 per reported minor injury.

In per-crash terms, the updated average social cost is estimated at \$4,445,600 per fatal crash, \$467,300 per serious crash and \$26,600 per minor crash. This is adjusted to \$772,000 per reported serious crash and \$85,000 per reported minor crash, after allowing for the level of non-reporting. Because each crash can result in multiple injuries of various injury severity, 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 2011

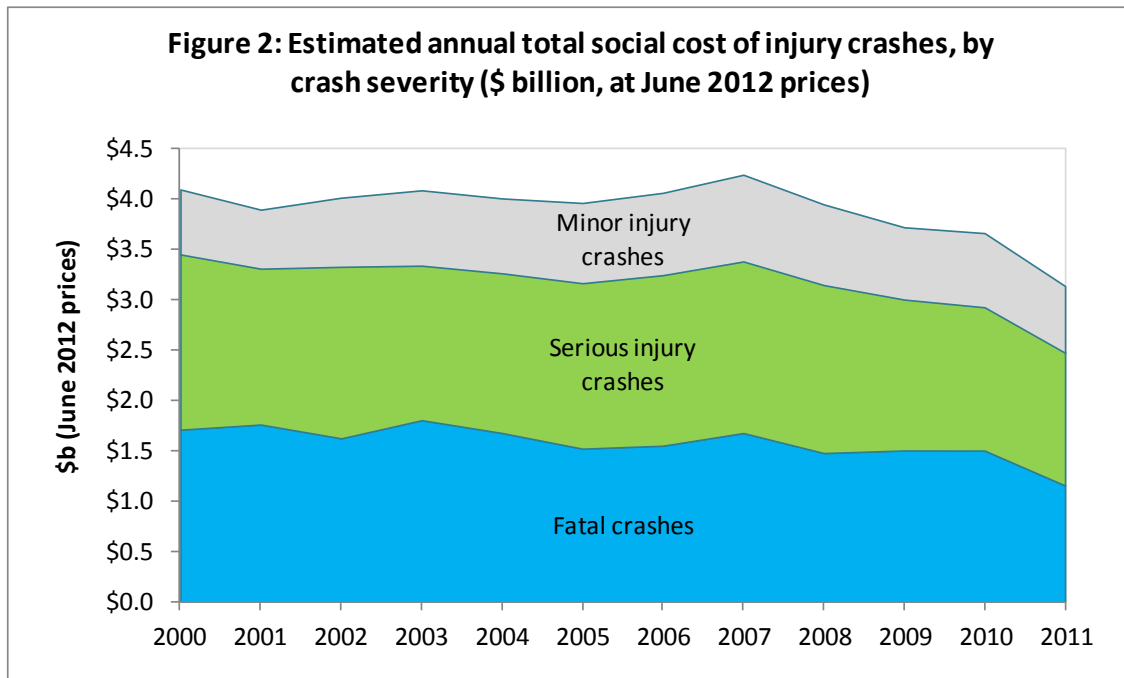
The total social cost of motor vehicle injury crashes in 2011 is estimated at approximately \$3.14 billion (down from \$3.67 billion in 2010), at June 2012 prices. Figure 1 shows loss of life and/or life quality due to permanent impairments accounted for approximately 91 percent of the total social cost of injury crashes. Vehicle damage accounted for around five percent, and other cost components made up the remaining four percent.

In addition, there are an estimated 201,600 non-injury crashes, valued at a further \$0.56 billion. Therefore, the total social cost of all motor vehicle crashes is estimated to have been \$3.70 billion (down from \$4.30 billion in 2010). These estimates include both reported and non-reported cases.



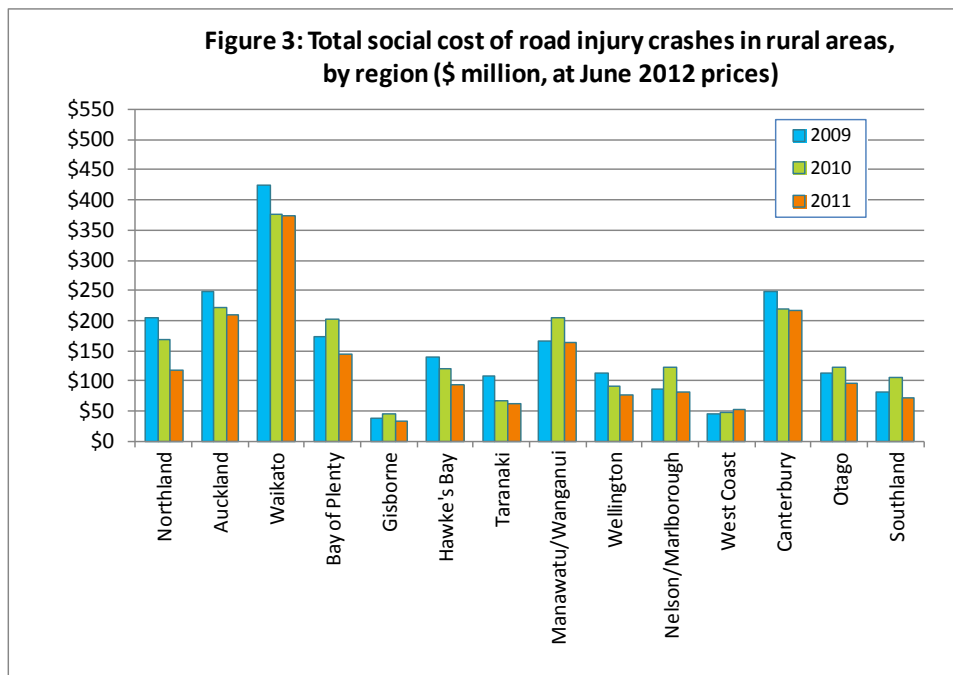
Annual total social cost of road crashes for the years from 2000 to 2011

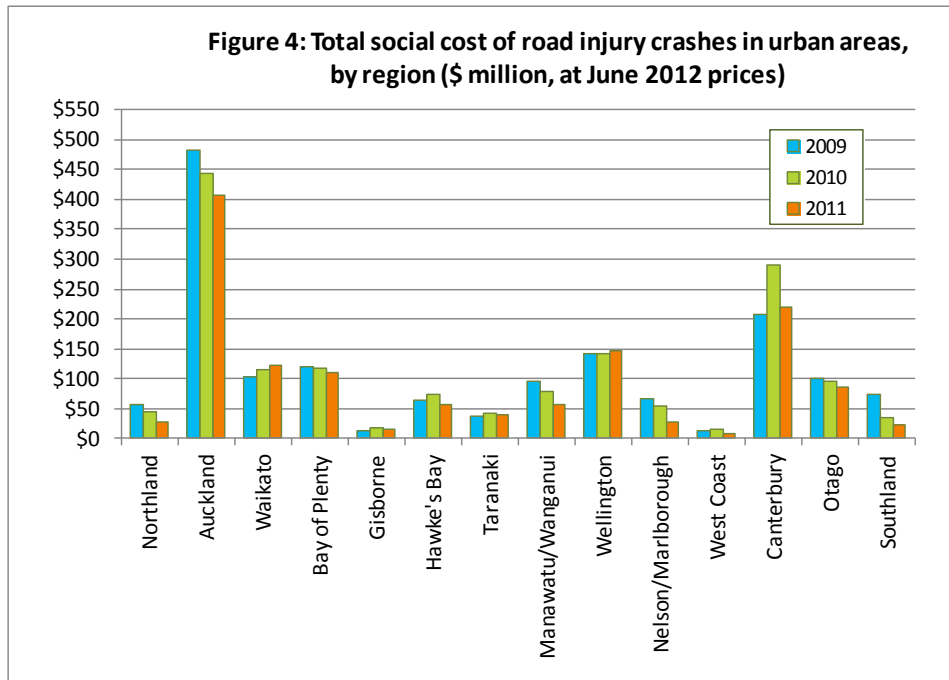
Figure 2 shows the trend of the estimated annual total social cost of injury crashes for the years from 2000 to 2011.



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 non-injury 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 2012 prices (\$)		
Loss of life/permanent disability	4,401,000	437,200	18,800
Loss of output (temporary disability)	700	1,500	300
Medical –			
Hospital/medical	8,200	10,100	200
Emergency/pre-hospital	4,000	1,500	800
Follow-on	2,100	5,000	100
Legal and court	18,700	5,100	800
Vehicle damage	10,900	6,900	5,500
Total	4,445,600	467,300	26,600

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 2012 prices (\$)		
Loss of life/permanent disability	3,770,600	377,100	15,100
Loss of output (temporary disability)	0	1,200	200
Medical –			
Hospital/medical	3,600	8,800	100
Emergency/pre-hospital	2,900	1,100	600
Follow-on	0	4,300	100
Legal and court	14,700	4,300	700
Vehicle damage	5,800	4,400	4,400
Total	3,797,600	401,100	21,300

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 non-injury crash

Per non-injury crash (Note)	June 2012 prices (\$)		
	All areas	Rural	Urban
Non-injury crash – vehicle damage	2,800	3,000	2,700

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 2012 prices (\$)		
	All	Rural	Urban
Fatal	4,445,000	4,513,000	4,275,000
Serious	772,000	823,000	722,000
Minor	85,000	91,000	81,000
Serious and minor	208,000	258,000	177,000
Fatal and serious	1,302,000	1,550,000	1,029,000
Fatal, serious and minor	332,000	483,000	233,000

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

Injury severity	June 2012 prices (\$)		
	All	Rural	Urban
Fatal	3,798,000	3,798,000	3,798,000
Serious	645,000	650,000	640,000
Minor	65,000	64,000	65,000
Serious and minor	161,000	184,000	143,000
Fatal and serious	1,066,000	1,196,000	904,000
Fatal, serious and minor	251,000	333,000	187,000

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

Injury severity	June 2012 prices (\$)		
	All	Rural	Urban
Fatal	3,792,000	3,792,000	3,792,000
Serious	638,000	642,000	634,000
Minor	52,000	50,000	53,000
Serious and minor	148,000	171,000	131,000
Fatal and serious	1,059,000	1,189,000	897,000
Fatal, serious and minor	238,000	321,000	175,000

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 2007 to 2011. 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 2012 prices (\$)		
	All	Rural	Urban
Overtaking or lane change	430,000	518,000	310,000
Head-on, not overtaking	924,000	1,265,000	378,000
Lost control, straight roads	349,000	368,000	321,000
Cornering	389,000	431,000	306,000
Collision with obstruction	212,000	300,000	179,000
Rear-end collision	149,000	195,000	120,000
Turning versus same direction	217,000	362,000	151,000
Crossing, no turns	257,000	559,000	215,000
Crossing, vehicle turning	233,000	461,000	172,000
Vehicles merging	184,000	285,000	167,000
Right turn against	232,000	393,000	204,000
Vehicle manoeuvring	226,000	414,000	194,000
Pedestrian crossing road	317,000	1,078,000	290,000
Pedestrian other	538,000	1,434,000	374,000
Miscellaneous	643,000	702,000	591,000

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 2009 to 2011. 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	Fatal	Serious	Crash severity			Fatal, serious and minor
			Minor	Serious and minor	Fatal and serious	
June 2012 prices (\$)						
All areas						
Northland	4,349,000	1,121,000	87,000	299,000	1,727,000	482,000
Auckland	4,230,000	583,000	83,000	144,000	1,038,000	214,000
Waikato	4,751,000	585,000	88,000	189,000	1,397,000	404,000
Bay of Plenty	4,488,000	1,103,000	84,000	311,000	1,650,000	483,000
Gisborne	5,296,000	1,376,000	83,000	323,000	1,853,000	448,000
Hawke's Bay	4,516,000	1,018,000	84,000	251,000	1,612,000	401,000
Taranaki	4,159,000	1,128,000	87,000	276,000	1,737,000	446,000
Manawatu-Wanganui	4,519,000	619,000	86,000	193,000	1,435,000	412,000
Wellington	4,363,000	776,000	80,000	195,000	1,059,000	253,000
Nelson-Marlborough	4,341,000	1,071,000	83,000	280,000	1,722,000	472,000
West Coast	4,383,000	676,000	88,000	248,000	1,294,000	461,000
Canterbury	4,297,000	780,000	86,000	245,000	1,151,000	352,000
Otago	4,260,000	682,000	89,000	212,000	985,000	288,000
Southland	4,697,000	914,000	91,000	265,000	1,410,000	402,000
New Zealand	4,445,000	772,000	85,000	208,000	1,302,000	332,000

Table 8 continued

Region	Average social cost per reported crash June 2012 prices (\$)					
	Fatal	Serious	Crash severity		Fatal and serious	Fatal, serious and minor
			Minor	Serious and minor		
Rural areas						
Northland	4,257,000	1,134,000	91,000	337,000	1,792,000	569,000
Auckland	4,239,000	613,000	88,000	155,000	1,324,000	280,000
Waikato	4,863,000	599,000	93,000	216,000	1,586,000	533,000
Bay of Plenty	4,583,000	1,181,000	92,000	371,000	1,961,000	669,000
Gisborne	5,296,000	1,416,000	93,000	461,000	2,129,000	745,000
Hawke's Bay	4,743,000	1,052,000	92,000	333,000	1,820,000	607,000
Taranaki	4,180,000	1,118,000	90,000	318,000	1,969,000	621,000
Manawatu-Wanganui	4,551,000	647,000	93,000	236,000	1,613,000	575,000
Wellington	4,694,000	830,000	86,000	233,000	1,389,000	377,000
Nelson-Marlborough	4,255,000	1,114,000	89,000	354,000	1,781,000	609,000
West Coast	4,486,000	667,000	90,000	259,000	1,358,000	514,000
Canterbury	4,115,000	834,000	91,000	308,000	1,329,000	497,000
Otago	4,464,000	694,000	94,000	247,000	1,111,000	377,000
Southland	4,586,000	923,000	92,000	304,000	1,443,000	478,000
New Zealand	4,513,000	823,000	91,000	258,000	1,550,000	483,000
Urban areas						
Northland	5,016,000	1,079,000	81,000	226,000	1,490,000	306,000
Auckland	4,223,000	572,000	81,000	140,000	920,000	191,000
Waikato	4,106,000	554,000	83,000	154,000	916,000	221,000
Bay of Plenty	4,211,000	1,031,000	78,000	268,000	1,308,000	342,000
Gisborne	4,275,000	1,314,000	76,000	226,000	1,314,000	226,000
Hawke's Bay	3,837,000	972,000	79,000	192,000	1,284,000	248,000
Taranaki	4,039,000	1,140,000	84,000	240,000	1,359,000	286,000
Manawatu-Wanganui	4,404,000	573,000	80,000	152,000	1,095,000	249,000
Wellington	3,832,000	752,000	78,000	181,000	892,000	207,000
Nelson-Marlborough	4,547,000	991,000	78,000	206,000	1,608,000	330,000
West Coast	3,798,000	704,000	85,000	222,000	1,061,000	322,000
Canterbury	4,631,000	740,000	83,000	213,000	1,004,000	275,000
Otago	3,836,000	670,000	85,000	187,000	850,000	225,000
Southland	5,004,000	898,000	89,000	217,000	1,342,000	306,000
New Zealand	4,275,000	722,000	81,000	177,000	1,029,000	233,000

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

Region	Injury severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious and minor
June 2012 prices (\$)						
All areas						
Northland	3,798,000	912,000	65,000	219,000	1,404,000	348,000
Auckland	3,798,000	504,000	66,000	115,000	881,000	168,000
Waikato	3,798,000	475,000	63,000	142,000	1,062,000	286,000
Bay of Plenty	3,798,000	885,000	65,000	234,000	1,309,000	355,000
Gisborne	3,798,000	1,073,000	67,000	242,000	1,417,000	330,000
Hawke's Bay	3,798,000	845,000	66,000	195,000	1,307,000	303,000
Taranaki	3,798,000	892,000	66,000	207,000	1,392,000	330,000
Manawatu-Wanganui	3,798,000	512,000	64,000	148,000	1,138,000	302,000
Wellington	3,798,000	673,000	66,000	159,000	909,000	205,000
Nelson-Marlborough	3,798,000	900,000	66,000	223,000	1,425,000	366,000
West Coast	3,798,000	543,000	64,000	185,000	1,014,000	333,000
Canterbury	3,798,000	682,000	65,000	189,000	996,000	268,000
Otago	3,798,000	567,000	65,000	155,000	814,000	209,000
Southland	3,798,000	740,000	64,000	188,000	1,115,000	278,000
New Zealand	3,798,000	645,000	65,000	161,000	1,066,000	251,000
Rural areas						
Northland	3,798,000	907,000	66,000	237,000	1,442,000	395,000
Auckland	3,798,000	498,000	66,000	119,000	1,041,000	205,000
Waikato	3,798,000	473,000	62,000	153,000	1,155,000	351,000
Bay of Plenty	3,798,000	867,000	64,000	247,000	1,441,000	434,000
Gisborne	3,798,000	1,047,000	66,000	293,000	1,547,000	464,000
Hawke's Bay	3,798,000	820,000	65,000	236,000	1,371,000	409,000
Taranaki	3,798,000	882,000	66,000	228,000	1,583,000	440,000
Manawatu-Wanganui	3,798,000	511,000	63,000	166,000	1,232,000	386,000
Wellington	3,798,000	658,000	65,000	175,000	1,073,000	274,000
Nelson-Marlborough	3,798,000	894,000	67,000	264,000	1,424,000	442,000
West Coast	3,798,000	540,000	64,000	191,000	1,056,000	363,000
Canterbury	3,798,000	677,000	64,000	219,000	1,082,000	350,000
Otago	3,798,000	563,000	64,000	171,000	885,000	254,000
Southland	3,798,000	738,000	64,000	208,000	1,132,000	318,000
New Zealand	3,798,000	650,000	64,000	184,000	1,196,000	333,000

Table 9 continued

Region	Average social cost per reported injury June 2012 prices (\$)					
	Fatal	Serious	Injury severity		Fatal and serious	Fatal, serious and minor
			Minor	Serious and minor		
Northland	3,798,000	930,000	65,000	179,000	1,261,000	240,000
Auckland	3,798,000	507,000	65,000	113,000	807,000	153,000
Waikato	3,798,000	482,000	65,000	123,000	785,000	174,000
Bay of Plenty	3,798,000	904,000	66,000	222,000	1,138,000	279,000
Gisborne	3,798,000	1,120,000	67,000	194,000	1,120,000	194,000
Hawke's Bay	3,798,000	889,000	66,000	160,000	1,185,000	206,000
Taranaki	3,798,000	906,000	66,000	187,000	1,083,000	221,000
Manawatu-Wanganui	3,798,000	514,000	65,000	128,000	936,000	201,000
Wellington	3,798,000	681,000	66,000	153,000	812,000	175,000
Nelson-Marlborough	3,798,000	913,000	66,000	176,000	1,428,000	276,000
West Coast	3,798,000	553,000	65,000	169,000	857,000	246,000
Canterbury	3,798,000	686,000	65,000	171,000	917,000	219,000
Otago	3,798,000	572,000	65,000	143,000	732,000	172,000
Southland	3,798,000	743,000	65,000	160,000	1,079,000	221,000
New Zealand	3,798,000	640,000	65,000	143,000	904,000	187,000

5 Crash statistics and price indices

Table 10: Reported and estimated number of crashes and injuries from 2009 to 2011

All areas								
	Reported crashes	Reported injuries			Estimated crashes	Estimated injuries		
		Fatal	Serious	Minor		Fatal	Serious	Minor
Fatal	933	1,043	442	444	933	1,043	442	444
Serious	5,537	0	6,332	2,254	9,147	0	10,457	3,731
Minor	25,345	0	0	31,674	80,859	0	0	101,052
Total	31,815	1,043	6,774	34,372	90,939	1,043	10,899	105,227
Rural areas								
	Reported crashes	Reported injuries			Estimated crashes	Estimated injuries		
		Fatal	Serious	Minor		Fatal	Serious	Minor
Fatal	667	753	358	344	667	753	358	344
Serious	2,720	0	3,229	1,448	4,596	0	5,453	2,437
Minor	9,219	0	0	12,126	29,413	0	0	38,686
Total	12,606	753	3,587	13,918	34,676	753	5,811	41,467
Urban areas								
	Reported crashes	Reported injuries			Estimated crashes	Estimated injuries		
		Fatal	Serious	Minor		Fatal	Serious	Minor
Fatal	266	290	84	100	266	290	84	100
Serious	2,817	0	3,103	806	4,551	0	5,004	1,294
Minor	16,126	0	0	19,548	51,446	0	0	62,366
Total	19,209	290	3,187	20,454	56,263	290	5,088	63,760

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 2012
Loss of life and life quality	Average hourly earnings (ordinary time)	QEX001AA	June 2011	\$26.21	2.9%
Loss of output			June 2012	\$26.96	
Medical cost	Producers price input index – Health and community services	PPI021AA (Base: Dec 2010=1000)	June 2011 June 2012	1015 1035	2.0%
Legal and court cost	Producers price input index – Legal services: Personal and Corporate	PPI018AA (Base: Dec 2010=1000)	June 2011 June 2012	1018 1059	6.3%
Vehicle damage cost	Consumers price index – Vehicle servicing & repairs	CPI013AA (Base: June 2006 =1000)	June 2011 June 2012	1221 1244	1.9%

Source: Infoshare, Statistics New Zealand.