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**An estimate of the unit cost of road traffic collisions in South Africa for 1998**

**DEPARTMENT OF TRANSPORT**



Contract Report CR-2000/4

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<b>SYNOPSIS</b>		<b>SYNOPSIS</b>	
<p>Padverkeerbotsings veroorsaak beide menslike en ekonomiese verliese. Owerhede en ander rolspeleers benodig betroubare inligting oor die impak van botsings op die ekonomie. Botsingskoste word ook in die ekonomiese ontleding van projekvoorstelle gebruik en dit is belangrik dat die jongste inligting hiervoor beskikbaar is. Die jongste Suid-Afrikaanse studie is in 1992 voltooi met 1991 data. Strukturele veranderinge in die ekonomie sedert toe het die resultate van daardie studie onbetroubaar gemaak.</p> <p>Hierdie studie is in twee fases gedoen. Fase 1 behels die hersiening van die metode vir die berekening van botsingskoste en die maak van voorstelle vir die opdatering van Suid-Afrikaanse botsingskoste. Fase 2 behels die berekening van botsingskoste. Relevantie aspekte rakende Fase 2 word in hierdie verslag saamgevat.</p> <p>Botsingskoste word in 1998 rand gegee.</p>		<p>Road traffic collisions result in both human loss and cost to the economy. Government and other role players addressing this problem require reliable information on the cost of collisions to the economy. Collision costs are also used in the economic evaluation of project proposals and it is essential that up-to-date information be available. The last South African study undertaken to estimate these costs was in 1992 using 1991 data. Structural economic changes since that time have rendered the results of that study unreliable.</p> <p>This study was done in two phases. In Phase 1 the methodology for the estimation of the costs of collisions was reviewed, and proposals were made for updating South African estimates. Phase 2 involved the actual estimation of collision costs. Relevant aspects relating to Phase 2 are documented in this report.</p> <p>Collision costs are given in 1998 rand.</p>	
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## REVIEW

The views and opinions expressed in this report are those of the authors and do not necessarily represent the policy of the Department of Transport.

The Department of Transport does not accept liability for the consequences of the application of the findings expressed in this report.

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# 1 INTRODUCTION

## 1.1 Background

Road traffic collisions have an enormous impact on South African society, in terms of both human loss, pain and suffering, and cost to the economy. It is evident that this situation cannot be left unattended and that all role-players, including government, should become and/or remain actively involved in addressing this problem. For this purpose, reliable information on the cost of road traffic collisions to the South African economy is needed. Collision costs are also an integral part of the economic evaluation of projects and it is essential that up-to-date information be used.

## 1.2 Problem statement

The previous study of this nature was done in 1992, using 1991 data. It is likely that the occurrence of structural economic changes since that time will have rendered the results of this study unreliable. Also, the method currently used in program CB-ROADS does not consider the income group of victims in the calculation of accident costs. It is necessary for the implications of this to be investigated. It is also necessary to investigate the nature and implications for South Africa of current "international best practice" for calculating accident costs.

## 1.3 Methodology

The economic cost of road traffic collisions results from the loss of output due to deaths and injuries, as well as the "physical" cost of accidents due to property damage, and medical and legal costs. To determine these costs, data from various sources have been analysed. These sources include Statistics South Africa (SSA), various insurance companies and the Road Accident Fund (RAF). The methodology adopted in estimating the various components of collision cost is explained in greater detail in Section 4 of this report.

## 1.4 Deliverables

The deliverables of this project are updated values for the cost of road traffic collisions by severity type (namely fatal, serious, slight and damage-only). The possibility of determining collision cost per type of collision (e.g. rear-end, side swipe) from available data will also be investigated, as well as the implications of using current international best practice for calculating collision cost. Specific project deliverables are spelled out in Section 2 of this report.

## 1.5 Scope of this report

This study was undertaken in two phases. *Phase 1* (completed in the 1998/99 financial year) focused on the methodology for the estimation of the costs of collisions, including the methodologies used for earlier South African studies between 1962 and 1992, and the international state-of-the-art of collision cost estimation. It also made proposals for updating South African estimates, using information sources including SSA, the National Traffic Information System (NaTIS), short-term insurance companies, the RAF and road operators. A separate report was produced for Phase 1 (1).

The *current* phase (*Phase 2*, undertaken in the 1999/2000 financial year) involves the actual calculation of collision costs, based on the recommendations made in the Phase 1 report. This report documents how this was done. In Section 2 the recommendations of Phase 1 are summarised and the implications for Phase 2 explained. Section 3 contains collision statistics and relevant definitions. Section 4 gives a detailed explanation of the estimation of the different cost components constituting collision costs, in particular the method used, the underlying rationale, assumptions made and the input data/sources. The results are summarised in Section 5. Finally, conclusions are drawn and recommendations made in Section 6.

## 2 IMPLICATIONS OF PHASE 1 RECOMMENDATIONS FOR THIS STUDY

### 2.1 Introduction

Phase 1 recommendations are contained in Sections 4, 5 and 6 of the Phase 1 report (1). Some of the more important recommendations that have direct implications for Phase 2 are summarised in the sections below. As a general point of departure, it is important to bear in mind that collision costs cannot be determined exactly and have to be estimated and that this estimation will necessarily be based on various assumptions.

### 2.2 Scope and emphasis of this study

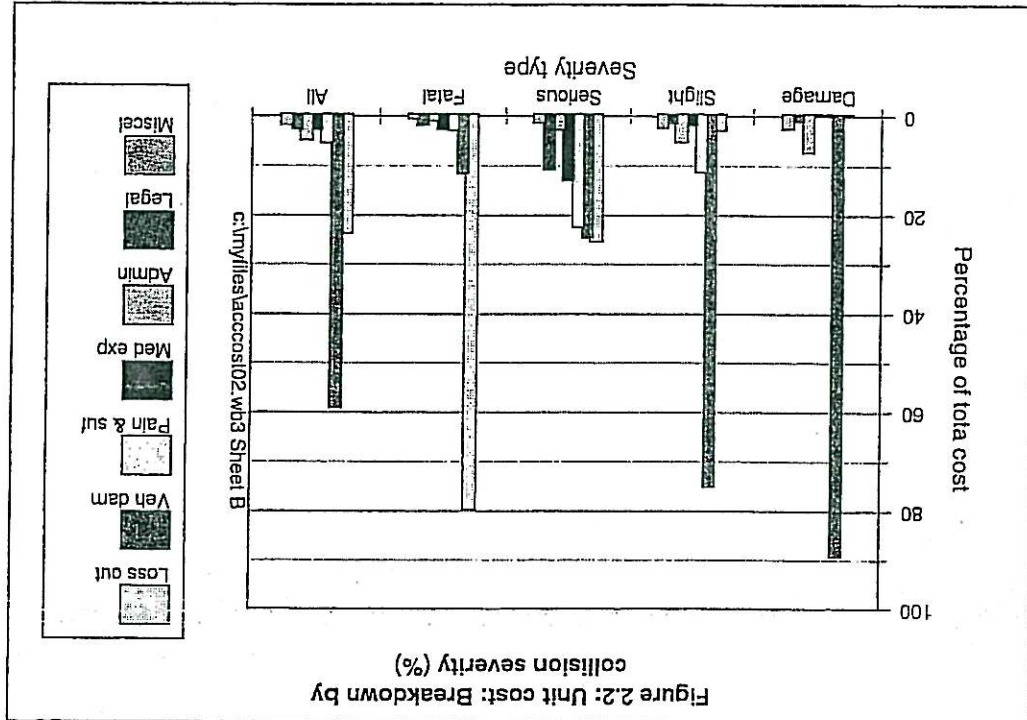
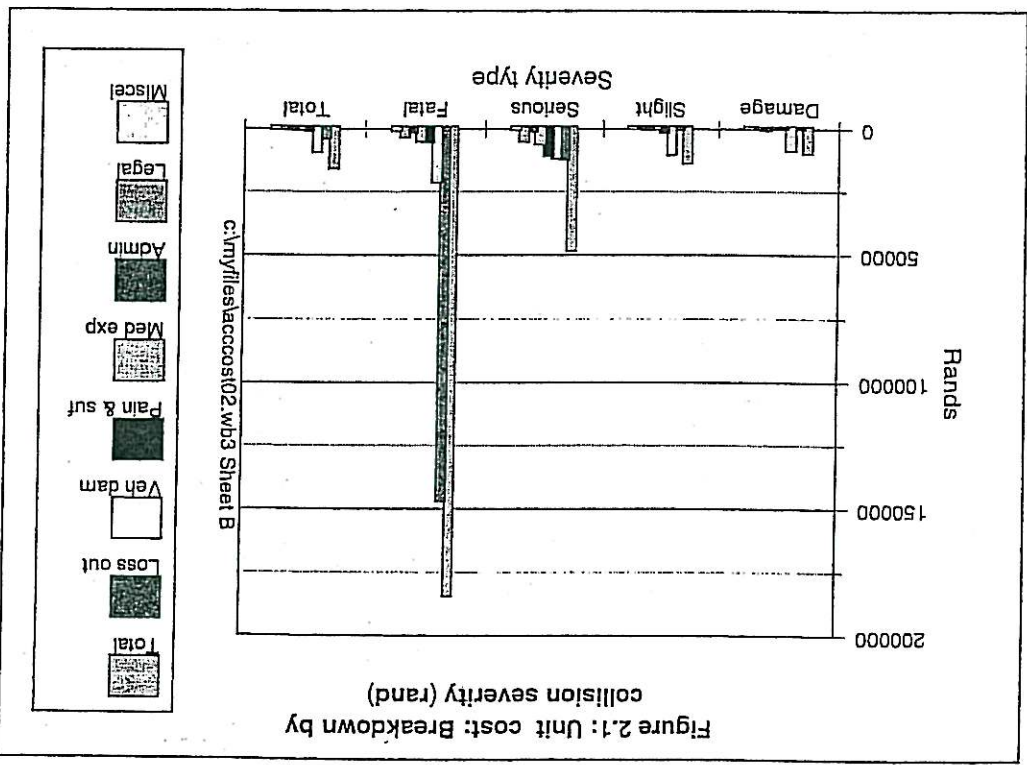
Regarding the scope and emphasis of this study, the following is stated in Section 4:

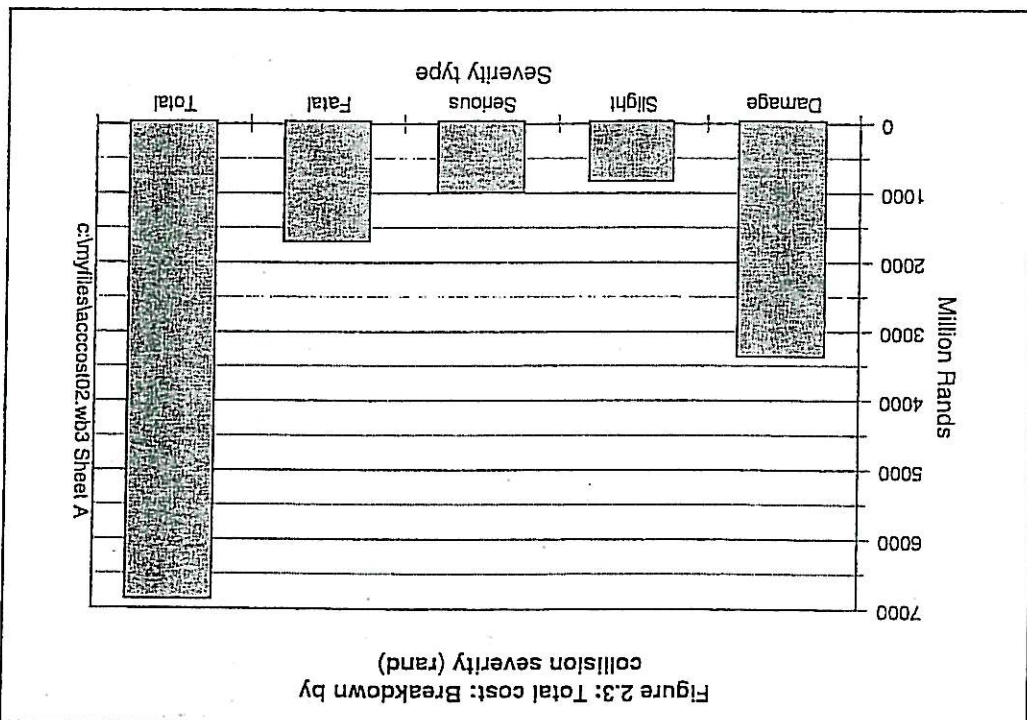
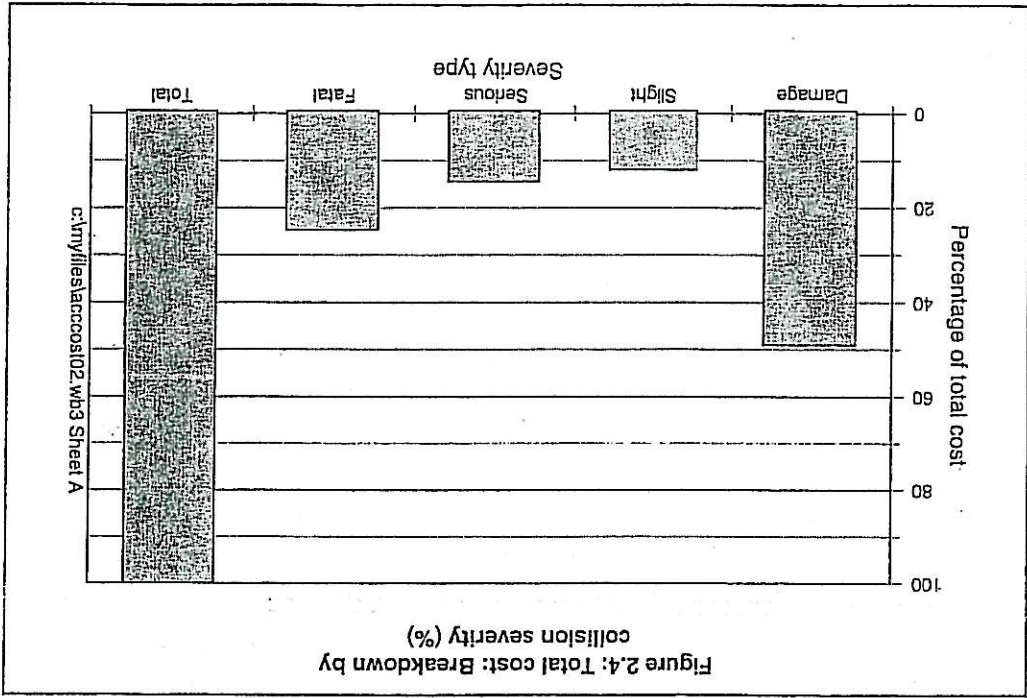
*"The primary use of the estimates which will be provided by this study is in the cost/benefit analysis of road investment alternatives. Therefore the study should cover the most significant collision cost components, for all types of collisions, nationwide, the greatest emphasis being on those cost components making up the greatest proportion of the total cost. It should not focus on specific cost components or on specific types of collisions." (1)*

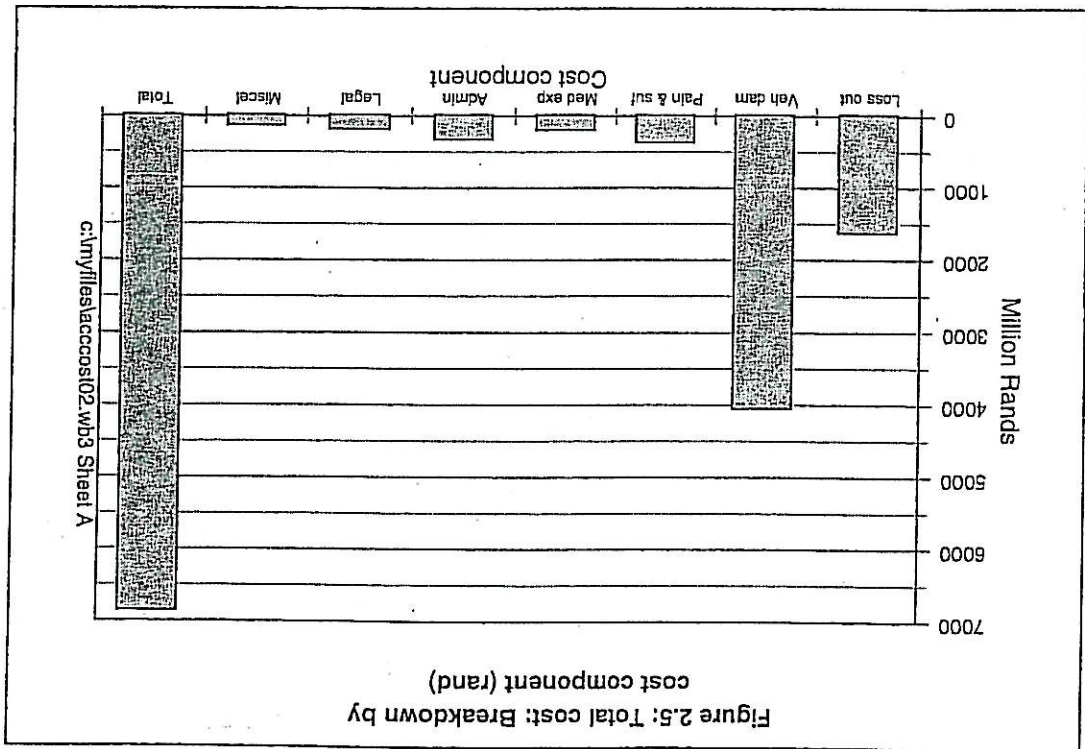
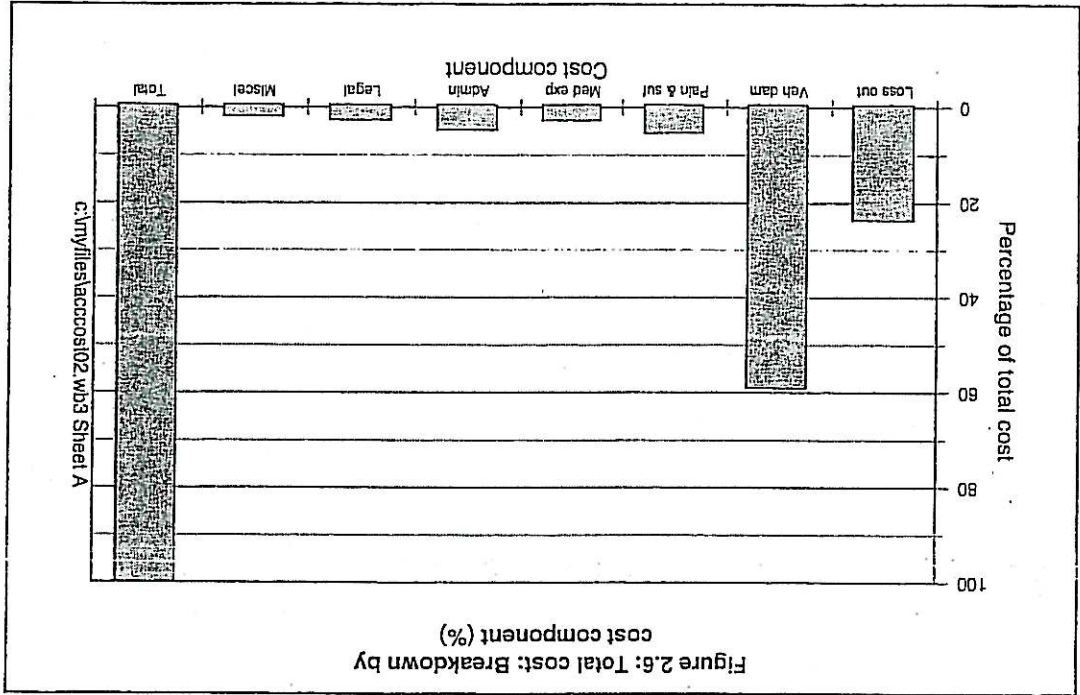
In this regard, Figures 2.1 to 2.6 (based on the information obtained in the 1992 report (2)) provide useful perspective. Figures 2.1 and 2.2 give the breakdown of the unit cost of collisions by severity type (damage-only, slight injury, serious injury and fatal) in rand and as a percentage respectively. Figure 2.1 shows the magnitude of the (total) cost of a fatal collision vis-a-vis the total cost of other types of collisions. Figure 2.2 shows the importance of vehicle damage costs in the case of damage-only collisions (almost 90 per cent of the cost of a damage-only collision), and the importance of loss of output in the case of fatal collisions (almost 80 per cent of the cost of a fatal collision).

Figures 2.3 and 2.4 show the total cost to the South African economy of different types of collisions (in 1991 rand and as a percentage respectively). Damage-only accidents cost the country R3 billion (1991 rand), which is almost 45 per cent of the total cost of collisions to the economy.

Figures 2.5 and 2.6 show total cost to the economy by cost component (in 1991 rand and percentages respectively). Vehicle damage amounted to more than R4 billion (in 1991 rand), which was almost 60 per cent of the total cost to the economy, followed by loss of output (approximately R1,5 billion, which is almost 25 per cent of the total cost.







### 2.3 Other aspects

#### 2.3.1 Approach used

Road traffic collisions include both "uncontroversial" resource costs (e.g. property damage, and medical, administrative and legal expenses) and "controversial" costs. The latter relate to the human elements of collisions. As discussed in Section 3.1 of the Phase 1 report (1), the two main methods for the determination of the latter are the "gross output" method (with allowances for intangibles) and the "willingness to pay" approach. For the reasons expressed by de Haan (2), the "gross output" approach, together with an allowance for the intangible elements of pain, grief and suffering and the loss of amenities of life, is currently considered to be the most appropriate for application in South Africa (1).

#### 2.3.2 Cost categories

The following cost components are suggested in Section 4.2:

- Loss of output
- Hospital, medical and funeral costs
- Pain, suffering, and loss of amenities of life
- Vehicle damage
- Damage to goods carried
- Damage to fixed property
- Legal costs
- Insurance administrative costs
- Towing costs
- Policing and promotion costs.

These components will be used in this study, with the exception of the last one as it in fact constitutes a fixed cost and will be almost insignificant when expressed as a unit cost.

#### 2.3.3 Calculation of loss of output

The loss of output of those killed in road collisions will be estimated using the following two methods:

- based on likely future earnings (i.e. using data from SSA or the RAF)
- based on GDP per capita (as was used in CB-ROADS).

#### 2.3.4 Segmentation of collision cost

In Table 3 of the Phase 1 report (1) the following breakdown of collision cost is suggested:

- by location:
  - urban vs rural
  - different provinces

All main calculations have been done on spreadsheets. This means that updates can easily be done and that the effect of changing input values (e.g. using different assumptions) will be immediately evident.

### 2.3.5 Use of spreadsheets

Regarding breakdown by location, it can be argued that urban cars may be involved in a rural collision and vice versa. The same argument applies in the case of a breakdown by province. Also, the scheme suggested in Table 3 of the Phase 1 report (1) implies a total of 2 160 options which is not technically feasible due to data requirements. For these reasons, breakdown by location and vehicle type has not been used in this study.

- by vehicle type involved:
  - motor car
  - motor cycle
  - pedestrian, cyclist or animal-drawn
  - minibus, bus
  - heavy goods vehicle
- by road user injured:
  - driver
  - passenger
  - pedestrian
- by severity of collision:
  - fatal
  - major or serious
  - minor or slight
  - damage-only.



### 3 COLLISION STATISTICS AND RELEVANT DEFINITIONS

#### 3.1 Definitions

The Central Statistical Services (CSS) classification and definitions of the severities of injuries and collisions are given below.

Classification and definitions of the severity of injuries sustained in road collisions	
Fatal injury	Injuries which cause death, either immediately or subsequently, but not later than six days after the collision
Serious injury	Fractures, crushings, concussion, internal injuries, severe cuts and lacerations, severe shock requiring medical treatment, and any other injuries which necessitate hospitalisation or confinement to bed
Slight injury	Cuts and bruises, sprains and light shock

Classification and definitions of the severity of a road collision	
Fatal collision	Collisions involving the death of persons, either immediately or subsequently as a direct result of the collision. Deaths up to six days after the date of collision are included
Major collision	Collisions involving serious injuries to persons
Minor collision	Collisions involving slight injuries to persons
Damage-only collision	Vehicle damaged, but no injury of any kind to persons

#### 3.2 Statistics

Road collision statistics for 1998 were obtained from the publication "Road Traffic Collisions", issued by Statistics South Africa (SSA) (3). The statistics used in this study are contained in Tables 3.1 to 3.8 below.

**Table 3.1: Road traffic collisions by degree of severity and status**

c:\myfiles\accost14.wb3 Sheet A

b	c	d	e	f
8	Injury	Driver and	Pedestrian	Total
9	severity	passenger		
10	Fatal	3797	3463	7260
11	Serious	11313	9952	21265
12	Slight	34175	17952	52097
13	Damage only	423994	6989	430983
14	Total	473249	38356	511605

**Table 3.2: Casualties by degree of severity and status**

c:\myfiles\accost14.wb3 Sheet B

b	c	d	e	f	g	h
6	Injury	Driver	Passenger	Sub-total	Pedestrian	Total
7	severity					
8	Fatal	2711	2875	5616	3452	9068
9	Serious	11627	14733	26360	9886	36246
10	Slight	37778	28684	66462	17896	84358
11	Total	52146	46292	98438	31234	129672

**Table 3.3: Vehicles involved in road traffic collisions**

c:\myfiles\accost14.wb3 Sheet C

b	c	d	e	f
6	Type of vehicle	Drivers and	Pedestrians	Total
7		passengers		
8	Motor car	519136	22643	541779
9	Light delivery vehicle	135541	6040	141581
10	Minibus	64194	5516	69710
11	Heavy commercial vehicle	42480	1012	43492
12	Articulated vehicle	2406	51	2457
13	Bus	8818	475	9293
14	Motor cycle	8575	384	8959
15	Sub-total	781150	36121	817271
16	Other	47030	2235	49265
17	Total	828180	38356	866536

Table 3.4: Fatalities by population and age group and status							
c:\myfiles\accost14.wb3 Sheet D							
b	c	d	e	f	g	h	i
6	Population group						
7	Age group	African	Coloured	Asian	White	Total	Percentage
8	Drivers and passengers						
9	0-19	253	57	17	131	458	8.16
10	20-29	1049	216	113	518	1896	33.76
11	30-39	864	122	53	311	1350	24.04
12	40-49	924	158	82	406	1570	27.96
13	50-59					0	0.00
14	60-65	40	9	6	30	85	1.51
15	65+	121	28	17	91	257	4.58
16	Total	3251	590	288	1487	5616	100.00
17	Pedestrians						
18	0-19	497	74	8	34	553	16.02
19	20-29	666	165	86	106	1023	29.63
20	30-39	500	120	54	66	740	21.44
21	40-49	625	121	89	29	914	26.48
22	50-59					0	0.00
23	60-65	36	5	3	12	56	1.62
24	65+	106	15	9	36	166	4.81
25	Total	2370	500	199	383	3452	100.00
26	All status						
27	0-19	690	131	25	165	1011	11.15
28	20-29	1715	381	199	624	2919	32.19
29	30-39	1364	242	107	377	2090	23.05
30	40-49	1549	279	121	535	2484	27.39
31	50-59	0	0	0	0	0	0.00
32	60-65	76	14	9	42	141	1.55
33	65+	227	43	26	127	423	4.66
34	Total	5621	1090	487	1870	9068	100.00

Table 3.5: Seriously injured by population and age group and status							
c:\myfiles\accost14.wb3 Sheet 1							
b	c	d	e	f	g	h	i
6	Age	Population group					
7	group	African	Coloured	Asian	White	Total	Percentage
8	Drivers and passengers						
9	0-19	871	256	81	687	1895	7.19
10	20-29	5781	883	473	2506	9643	36.58
11	30-39	4208	542	201	1466	6417	24.34
12	40-49	2635	306	240	927	4108	15.58
13	50-59	1672	310	170	761	2913	11.05
14	60-65	207	23	25	92	347	1.32
15	65+	622	68	73	274	1037	3.93
16	Total	15996	2388	1263	6713	26360	100.00
17	Pedestrians						
18	0-19	1380	275	72	167	1894	19.16
19	20-29	1969	336	162	335	2802	28.34
20	30-39	1468	200	119	191	1978	20.01
21	40-49	1044	124	92	157	1417	14.33
22	50-59	771	185	24	164	1144	11.57
23	60-65	111	12	12	28	163	1.65
24	65+	333	38	34	85	488	4.94
25	Total	7076	1170	515	1125	9886	100.00
26	All status						
27	0-19	2251	531	153	854	3789	10.45
28	20-29	7750	1219	635	2841	12445	34.33
29	30-39	5676	742	320	1657	8395	23.16
30	40-49	3679	430	332	1064	5525	15.24
31	50-59	2443	495	194	925	4057	11.19
32	60-65	318	35	37	120	510	1.41
33	65+	955	106	107	357	1525	4.21
34	Total	23072	3558	1778	7838	36246	100.00

Table 3.6: Slightly injured by population and age group and status						
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b	c	d	e	f	g	h
6	Age			Population group		
7	group	African	Coloured	Asian	White	Total
8	Drivers and passengers					
9	0-19	1997	986	317	2959	6059
10	20-29	10192	2662	1460	8933	23247
11	30-39	8727	1934	771	5496	16928
12	40-49	5085	1048	666	3461	10260
13	50-59	2826	802	402	2581	6611
14	60-65	936	79	56	368	839
15	65+	1010	238	167	1103	2518
16	Total	30073	7649	3839	24901	66462
17	Pedestrians					
18	0-19	1876	719	197	509	3301
19	20-29	9022	816	447	828	5113
20	30-39	2247	545	299	528	3619
21	40-49	1604	298	222	434	2558
22	50-59	1179	383	63	428	2048
23	60-65	178	36	21	78	313
24	65+	535	109	65	235	944
25	Total	10641	2906	1314	3035	17896
26	All status					
27	0-19	3773	1605	514	3468	9360
28	20-29	13214	3478	1907	9761	28360
29	30-39	10974	2479	1070	6024	20547
30	40-49	6689	1346	888	3895	12818
31	50-59	4005	1185	465	3004	8659
32	60-65	514	115	77	446	1152
33	65+	1545	347	232	1338	3462
34	Total	40714	10555	5153	27936	84358

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**Table 3.8: Number of vehicles per collision by severity and status**

b	c	d	e	f	g	h
6	Status	Collision severity				
7	Fatal	1:582	1:626	1:767	1:455	
8	injury					
9	injury	1:455	1:626	1:767	1:455	
10	Drivers and passengers	0:997	0:993	0:997	1:000	0:817
11	Pedestrians	1:238	1:310	1:410	1:755	1:694
11	All					

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**Table 3.7: Number of casualties per collision by severity and status**

b	c	d	e	f
6	Collision	Number of	Number of persons	Number of persons
7	severity	persons killed	seriously injured	slightly injured
8	Drivers and passengers			
9	Fatal	1:479	1:627	1:223
10	Serious		1:784	0:816
11	Slight			1:540
12	Pedestrians			
13	Fatal	0:997	0:024	0:008
14	Serious		0:985	0:013
15	Slight			0:988
16	All			
17	Fatal	1:249	0:863	0:643
18	Serious		1:410	0:410
19	Slight			1:350

## 4 ESTIMATION OF COLLISION COSTS

### 4.1 Introduction

The cost components considered in this study and their relevance to collision severity are explained in Table 4.1. The same methodology and assumptions as employed in a previous study (2) were used, except where indicated otherwise.

Input data of a general nature, i.e. relating to most if not all cost components, are contained in Tables 3.1 to 3.8 in Section 3. These data sets were obtained from the document "Road Traffic Collisions" for 1998, published by Statistics South Africa (SSA) (3). Detailed calculations are contained in the appendices for each of the cost components considered in this analysis. The study results are summarised in Section 5.

Table 4.1: Unit cost of accidents: Breakdown of total cost and applicability of cost components in terms of collision severity					
#	Description	Cost component			Accident severity type
		Damage only	Slight injury	Serious injury	
1	Loss of output				
	Due to fatality	Not applicable	Not applicable	Not applicable	✓
	Due to serious injury				
	Not permanently disabled	Not applicable	Not applicable	Not applicable	✓
	Permanently disabled				
	Partially disabled	Not applicable	Not applicable	Not applicable	✓
	Totally disabled	Not applicable	Not applicable	Not applicable	✓
	Due to slight injury	Not applicable	Not applicable	Not applicable	✓
2	Property damage costs				
	Damage to vehicles involved in the collision	✓	✓	✓	✓
	Damage to property inside the vehicle (mostly goods in transit)	Not calculated	Not calculated	Not calculated	Not calculated
	Damage to property outside the vehicle (e.g. road furniture and fixed property)	Not calculated	Not calculated	Not calculated	Not calculated
3	Pain, suffering and loss of amenities of life	Not applicable	✓	✓	✓
4	Hospital, medical and funeral costs				
	Hospital costs	Not applicable	✓	✓	✓
	Medical costs	Not applicable	✓	✓	✓



**Table 4.1: Unit cost of accidents: Breakdown of total cost and applicability of cost components in terms of collision severity**

Cost component		Accident severity type			
#	Description	Damage only	Slight injury	Serious injury	Fatal
5	Funeral costs	Not applicable	Not applicable	Not applicable	✓
	Administration costs				
	Insurance administrative costs	✓	✓	✓	✓
	Police investigation and administration costs	✓	✓	✓	✓
6	Legal costs				
	Legal costs w.r.t. motor vehicle claims	✓	✓	✓	✓
	Legal costs w.r.t. MMF (RAF) claims	Not applicable	✓	✓	✓
	Medico-legal costs	Not applicable	✓	✓	✓
7	Miscellaneous				
	Loss of time	✓	✓	✓	✓
	Towing costs	✓	✓	✓	✓
	Other (e.g. flowers, cards, telephone calls)	✓	✓	✓	✓

**4.2 Loss of output**

**4.2.1 Loss of output due to fatalities**

Loss of output due to fatalities (premature death) is defined as the output that would have been produced over the remainder of their economic lives by those people killed in road collisions. In order to calculate this, various steps are involved. Firstly, the age profile of people killed in collisions is needed. Total fatalities in a given period are then adapted for the likelihood that some of the victims would have died before the age of 65 from causes other than road collisions, and for the fact that some people are unemployed. Future

output of the balance of victims is then calculated and expressed as a present value using the official discount rate of 8 per cent per annum in real terms.

Information on annual income per person employed and unemployment rates was obtained from Statistics South Africa (SSA) and is based on the 1996 census. Detailed calculations for the loss of output due to fatalities are contained in Appendix A.1.

#### 4.2.2 Loss of output due to serious injuries

Loss of output in the case of serious injuries results from the fact that victims are unable to produce at their normal rate, either temporarily or permanently, depending on the nature of the injuries. Loss of output in the case of serious injuries was therefore calculated by classifying serious casualties into the following groups:

- not permanently disabled
- permanently disabled.

Victims permanently disabled were further classified as either partially or totally disabled.

Assumptions, input values and calculations are contained in Appendix A.2.

#### 4.2.3 Loss of output due to slight injuries

Loss of output in the case of slight injuries results from the fact that victims will take sick leave and that the economy will consequently suffer a corresponding loss in output. Calculations are shown in Appendix A.3.

#### 4.2.4 Total loss of output due to road traffic collisions

Loss of output due to premature death, serious injuries and slight injuries are given in Appendix A.4 and allocated to collisions by severity type and to "drivers and passengers", "pedestrians" and "all".

### 4.3 Property damage

Property is the largest contributor to the total cost of road traffic collisions. More than 50 per cent of the total cost to the national economy is in the form of property damage cost. This cost component can be divided into the following categories:

- damage to vehicles involved in road collisions
- damage to property inside the vehicle (mostly goods in transit)
- damage to property outside the vehicle, e.g. road furniture and fixed property.

The first of these categories is by far the most important. Also, no reliable information is available for the other two categories. For this reason, they were omitted from the calculations.

In order to obtain reliable information on vehicle damage costs, a number of the largest vehicle insurance companies were visited. In contrast to previous studies, information on the average cost per claim is based on the total sample (number of claims handled during a given period) of the relevant companies, and not on a sample of claims.

Assumptions, calculations and results are contained in Appendix B.

#### **4.4 Pain, suffering and loss of amenities of life**

Although this component is important, there is little or no information available to quantify it. Also, this cost excludes the costs suffered by the family of the victim. Appendix C contains the results of this quantification, based on information obtained from the Road Accident Fund (RAF).

#### **4.5 Hospital, medical and funeral costs**

Of these, hospital and medical costs are self-explanatory. Funeral costs are defined as the difference between the current cost of a funeral and the discounted cost of a funeral at the "normal" time of death. Calculations are contained in Appendix D.

#### **4.6 Administration costs**

Administration costs can be divided into two categories:

- insurance administration costs
- police costs.

This component of road collision cost is quantified in Appendix E.

#### **4.7 Legal costs**

"These costs are incurred when there is a legal dispute between the parties involved regarding liability; when legal proceedings are brought by the State against one or more of those involved; during the preparation of certain claims by policy holders or claimants, and during the investigation of claims by insurance companies" (2). They are borne by short-term insurance companies, vehicle owners or drivers, collision casualties and their dependants, and the State. The following three categories can be distinguished:

- legal costs paid out in the motor vehicle claims
- legal costs paid out to the injured person by the Road Accident Fund (RAF)
- costs involved for the medico-legal report requested by the RAF.

Calculations and results are contained in Appendix F.

#### 4.8 Miscellaneous costs

This cost comprises the following components:

- loss of time other than that computed in Appendix A, which results from a number of reasons, e.g. completing forms, visiting insurance companies and workshops, visiting family and friends in hospital and attending funerals
- towing costs
- other, e.g. flowers, cards, telephone calls.

Calculations are contained in Appendix G.

## 5 SUMMARY OF RESULTS

5-1

Results pertaining to the unit cost of road traffic collisions by collision severity type are given in Table 5.1 and Figure 5.1 for three scenarios, namely:

- drivers and passengers
- pedestrians
- all.

There are important differences between the values obtained for these scenarios and the user is cautioned to use the cost estimate applicable to the specific situation.

Thereafter, information on the total cost of collisions is given in Tables 5.2 and 5.3, and in Figures 5.2 to 5.5. Information on the unit cost of accidents is given in Tables 5.4 and 5.5, and in Figures 5.6 and 5.7.

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**Table 5.1: Unit cost of collisions by severity and status (rand)**

b	c	d	e	f
6	Collision severity	Status		
7		Drivers and passengers	Pedestrians	All
8	Fatal	572386	187562	388487
9	Serious	122415	49189	88248
10	Slight	32793	6455	23723
11	Damage only	15936	983	15694
12	All	24163	32897	24817

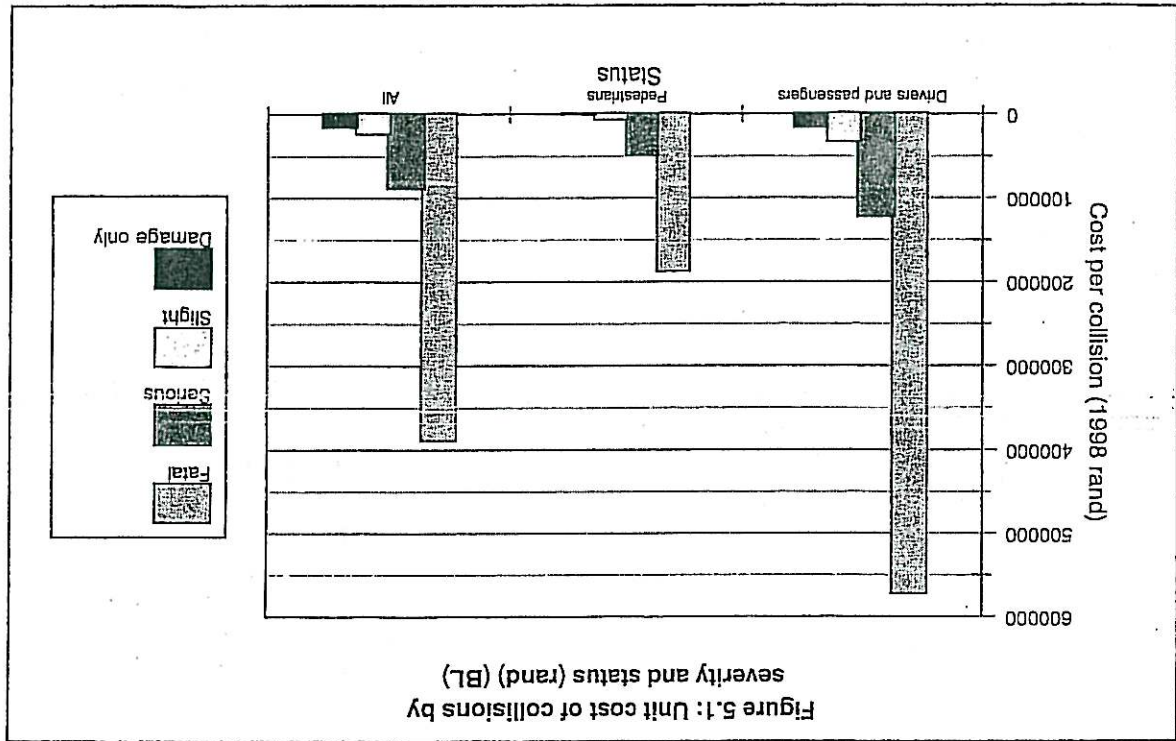


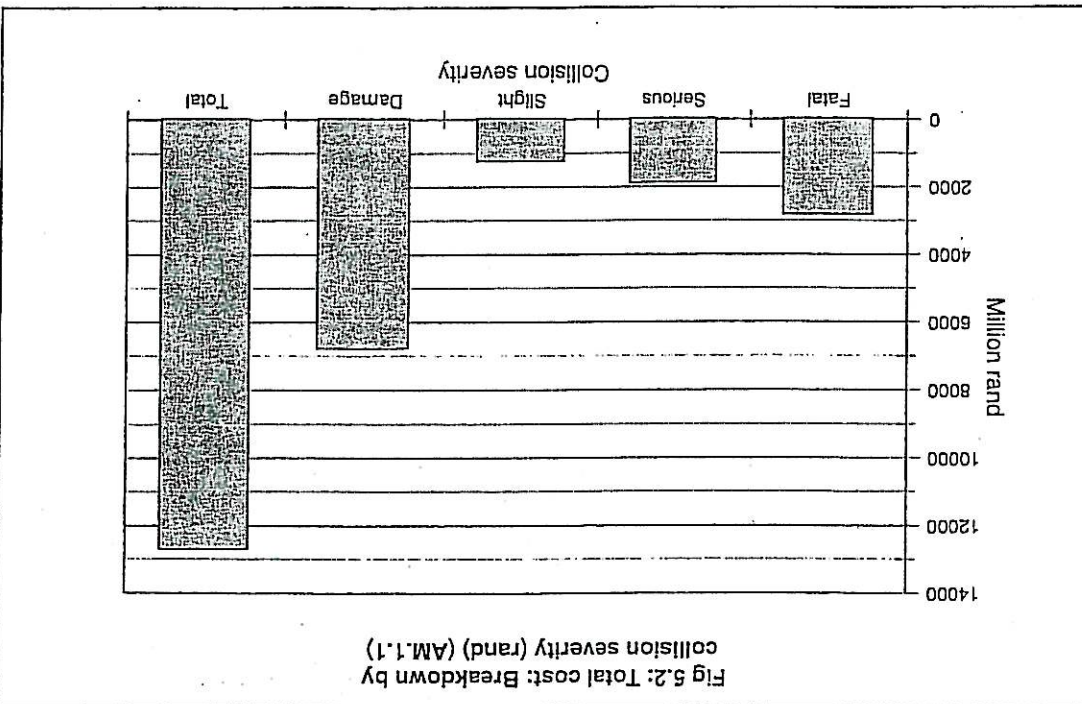
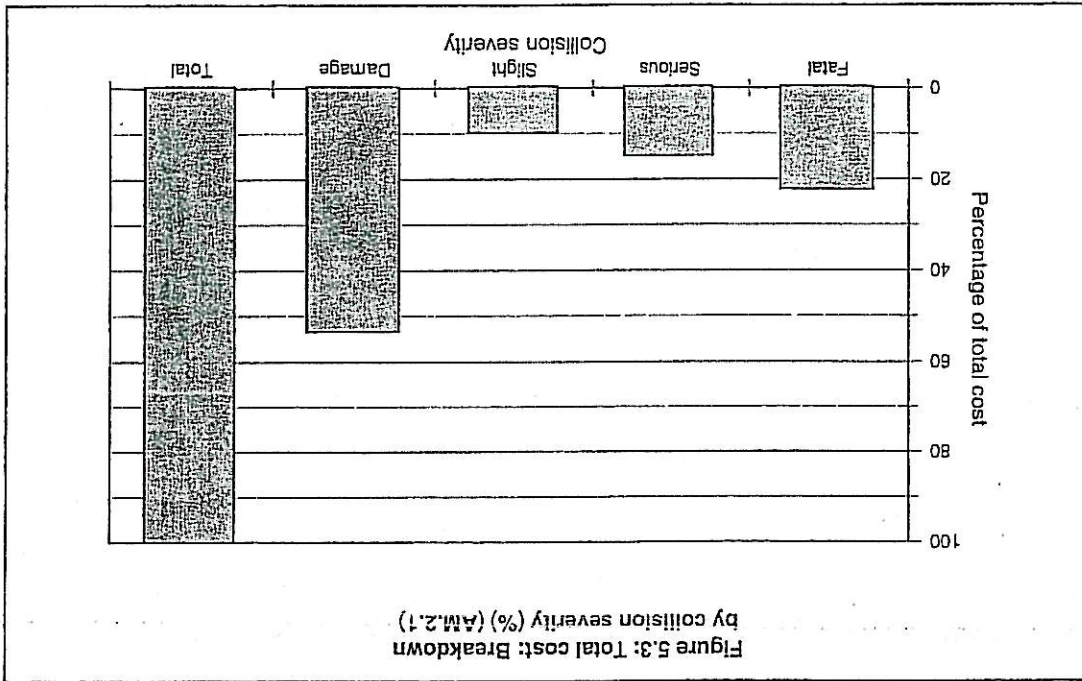
Table 5.2: Total cost: Breakdown by collision severity and cost component (rand)						
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b	c	d	e	f	g	h
7	Severity type					
8	Fatal	Serious	Slight	Damage	Total	Tot (million)
9						
10	Drivers and passengers					
11	2173351440	1384884169	1119713393	6756970987	11434919989	11435
12	1634634758	285394681	30686826	0	1950716265	1951
13	277334411	375513048	841917244	6030611080	7525375783	7525
14	104753198	328126754	123892616	0	556772568	557
15	90679116	231070120	25115074	0	346864310	347
16	11672211	27644626	52765644	444448197	536530678	537
17	43278557	115005697	15837972	79044609	253166836	253
18	10999188	22129242	29498018	202867101	265493549	265
19	3797	11313	34145	423994	473249	
20	572386	122415	32793	15936	24163	
21	2173.351	1384.884	1119.713	6756.971	11434.920	12696.722
Pedestrians						
22	649527407	489525642	115882429	6866828	1261802306	1262
23	599354618	86678829	6145179	0	692178626	692
24	599354618	86678829	6145179	0	692178626	692
25	14443263	2755943	24929750	0	66932446	67
26	1321362	149137782	41788372	0	192247516	192
27	12660966	110165156	8471191	0	131297314	131
28	11894470	23812734	26027479	6328795	68063479	68
29	7349336	87982602	5738517	0	101070455	101
30	2503391	4189106	2781941	538033	10012470	10
31	3463	9352	17952	5989	38356	
32	187562	49189	6455	983	32897	
33	649.527	489.526	115.882	6.867	1261.802	12696.722
All						
34	2820418121	1876585743	1235880543	6763837815	12696722295	12697
35	2225574943	379819537	37500239	0	2642894891	2643
36	2225574943	379819537	37500239	0	2642894891	2643
37	291777675	403072481	866846994	6030611080	7592308229	7592
38	106074560	477264536	165880988	0	749020084	749
39	103340083	341235276	33586265	0	478161624	478
40	23566681	51457361	78793123	450776992	604594157	605
41	56581601	197418204	21192976	79044609	354237291	354
42	13502579	26318347	32279959	203405134	275506019	276
43	7260	21265	52097	430983	511605	
44	388487	88248	23723	15694	24817	
45	2820.418	1876.586	1235.881	6763.838	12696.722	12696.722

**Table 5.3: Total cost: Breakdown by collision severity and cost component (percentage)**

b	c	d	e	f	g	h	i
52	Cost item	Fatal	Serious	Slight	Damage	Total	% of total
53			Injury	Injury	only		
54							
55	Drivers and passengers						
56	Total	19	12	10	59	100	100
57	Loss of output	84	15	2	0	100	17
58	Property damage	4	5	11	80	100	66
59	Pain and suffering, etc	19	59	22	0	100	5
60	Hospital, medical, etc	26	67	7	0	100	3
61	Administration	2	5	10	83	100	5
62	Legal	17	45	6	31	100	2
63	Miscellaneous	4	8	11	76	100	2
Pedestrians							
64	Total	51	39	9	1	100	100
66	Loss of output	87	13	1	0	100	55
67	Property damage	22	41	37	0	100	5
68	Pain and suffering, etc	1	78	22	0	100	15
69	Hospital, medical, etc	10	84	6	0	100	10
70	Administration	17	35	38	9	100	5
71	Legal	7	87	6	0	100	8
72	Miscellaneous	25	42	28	5	100	1
All							
74	Total	22	15	10	53	100	100
75	Loss of output	84	14	1	0	100	21
76	Property damage	4	5	11	79	100	60
77	Pain and suffering, etc	14	64	22	0	100	6
78	Hospital, medical, etc	22	71	7	0	100	4
79	Administration	4	9	13	75	100	5
80	Legal	16	56	6	22	100	3
81	Miscellaneous	5	10	12	74	100	2

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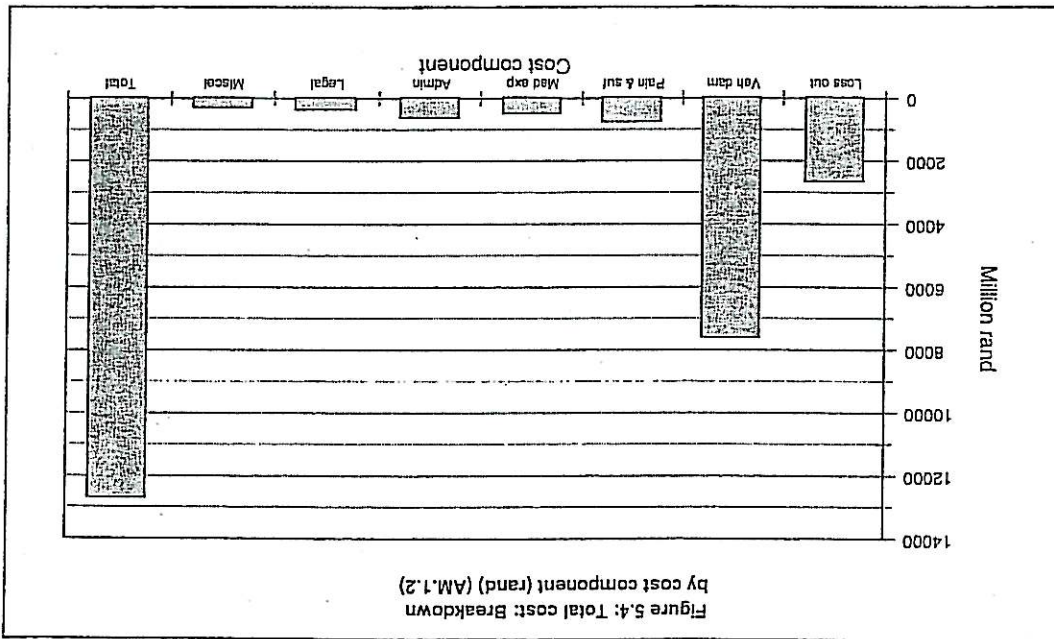
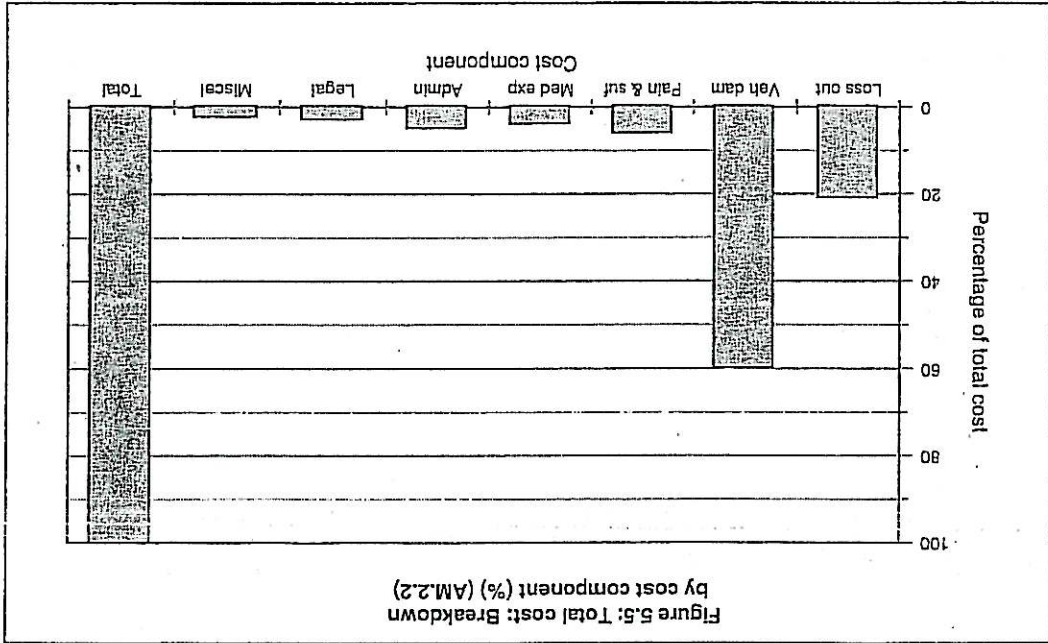
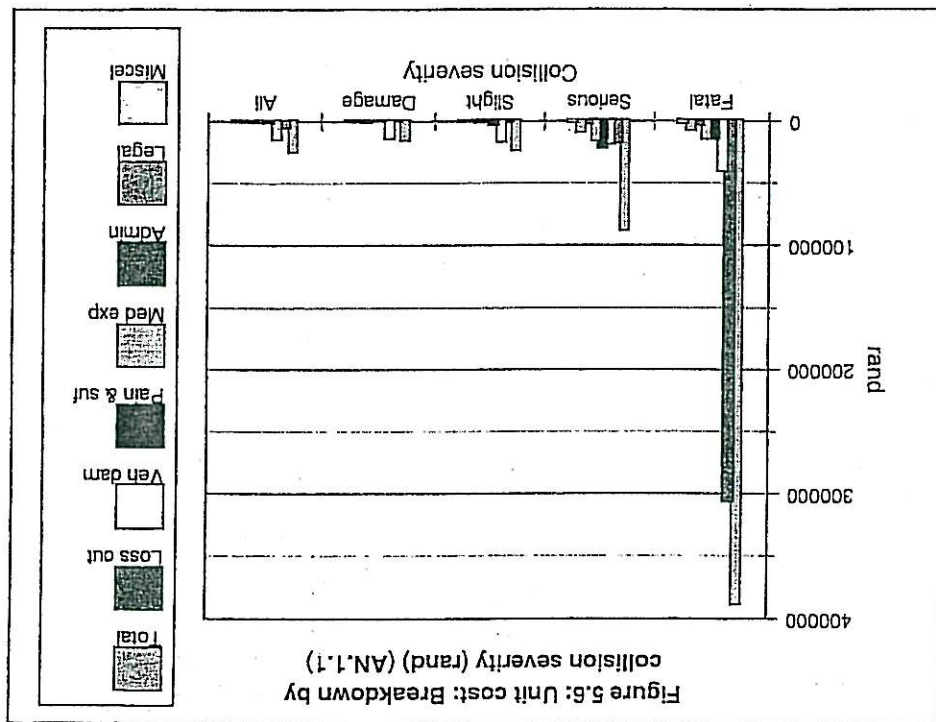
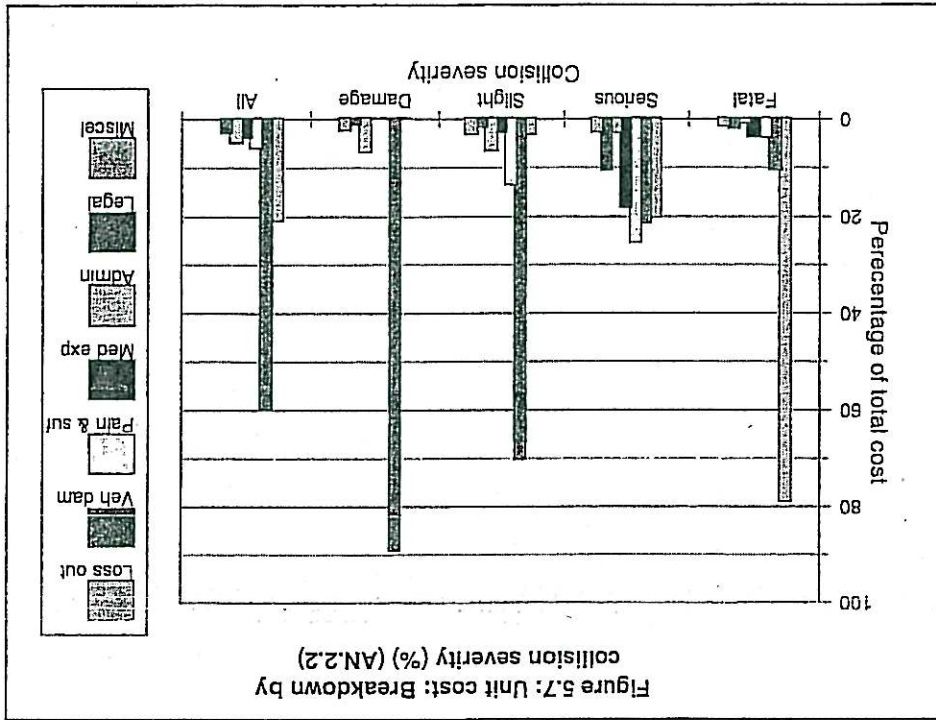


Table 5.4: Unit cost: Breakdown by collision severity

and cost component (rand)							c:\myfiles\accost14.wb3 Sheet AN.1						
b	c	d	e	f	g	h	Severity type						
							Fatal		Serious		Slight		Damage
8			Injury		Injury		only		All				
9													
10	Drivers and passengers												
11	Total	572386	122415	32793	15936	24163	12	Loss of output	430507	25227	899	0	4122
13	Property damage	73040	33193	24657	14223	15902	14	Pain and suffering, etc	27588	29004	3628	0	1176
15	Hospital, medical, etc	23882	20425	736	0	733	16	Administration	3074	2444	1545	1048	1134
17	Legal	11398	10166	464	186	535	18	Miscellaneous	2897	1956	864	478	561
19	Number of collisions	3797	11313	34145	423994	473249	20	Pedestrians					
21	Total	187562	49189	6455	983	32897	22	Loss of output	173074	8710	342	0	18046
23	Property damage	4171	2769	1389	0	1745	24	Pain and suffering, etc	382	14986	2328	0	5012
25	Hospital, medical, etc	3656	11070	472	0	3423	26	Administration	3435	2393	1450	906	1775
27	Legal	2122	8841	320	0	2635	28	Miscellaneous	723	421	155	77	261
29	Number of collisions	3463	9952	17952	6989	38356	30	All					
31	Total	368487	99248	23723	15694	24817	32	Loss of output	306553	17861	720	0	5166
33	Property damage	40190	18955	16639	13993	14840	34	Pain and suffering, etc	14611	22444	3180	0	1464
35	Hospital, medical, etc	14234	16047	645	0	935	36	Administration	3246	2420	1512	1046	1182
37	Legal	7794	9284	407	183	692	38	Miscellaneous	1860	1238	620	472	539
39	Number of collisions	7260	21265	52097	430983	511605							

Table 5.5: Unit cost: Breakdown by collision severity and cost component (percentage)						
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b	c	d	e	f	g	h
46	Cost	Severity type				
		Fatal	Serious	Slight	Damage	All
47	category	Injury				
48		Injury				
49	Drivers and passengers					
50	Total	100	100	100	100	100
51	Loss of output	75	21	3	0	17
52	Property damage	13	27	75	89	66
53	Pain and suffering, etc	5	24	11	0	5
54	Hospital, medical, etc	4	17	2	0	3
55	Administration	1	2	5	7	5
56	Legal	2	8	1	1	2
57	Miscellaneous	1	2	3	3	2
58	Pedestrians					
59	Total	100	100	100	100	100
60	Loss of output	92	18	5	0	55
61	Property damage	2	6	22	0	5
62	Pain and suffering, etc	0	30	36	0	15
63	Hospital, medical, etc	2	23	7	0	10
64	Administration	2	5	22	92	5
65	Legal	1	18	5	0	8
66	Miscellaneous	0	1	2	8	1
67	All					
68	Total	100	100	100	100	100
69	Loss of output	79	20	3	0	21
70	Property damage	10	21	70	89	60
71	Pain and suffering, etc	4	25	13	0	6
72	Hospital, medical, etc	4	18	3	0	4
73	Administration	1	3	6	7	5
74	Legal	2	11	2	1	3
75	Miscellaneous	0	1	3	3	2



## 6 LOSS OF OUTPUT USING THE CB-ROADS METHOD

### 6.1 Background

Program CB-Roads provides a different method for calculating the loss of output due to fatalities and injuries. It is stated that the "production value of the life of a person is directly related to the age of the person" (4). In this section the CB-Roads method is summarised and compared with the method used in this study. The results obtained from the two methods are also compared.

### 6.2 Explanation of method

With the CB-Roads method, the "production cycle of a person" is an important concept. It is stated that this cycle consists of three phases:

- development phase
- productive phase
- decay or deterioration phase.

This cycle is presented graphically in Figure 6.1, where production at any given age is shown in proportion to GDP per capita. If a life expectancy of 80 years is assumed, it means that, in mathematical terms, the rectangular area should be equal to the area under the curve. As mentioned before, the loss of output in the case of a fatality will be dependent on the victim's age at death. It will be equal to the present value of future output at the age of death. Given the age profile of people killed in road traffic collisions, the average "value" of a fatality is determined by weighing the present value of future output at different ages by the relative contribution of that age group to total fatalities.

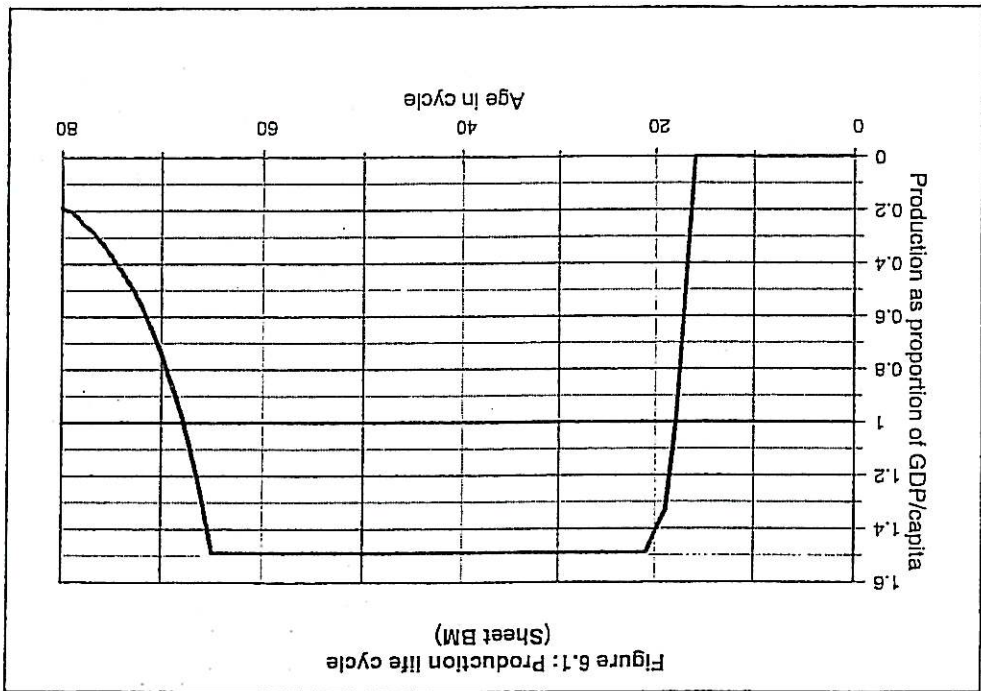
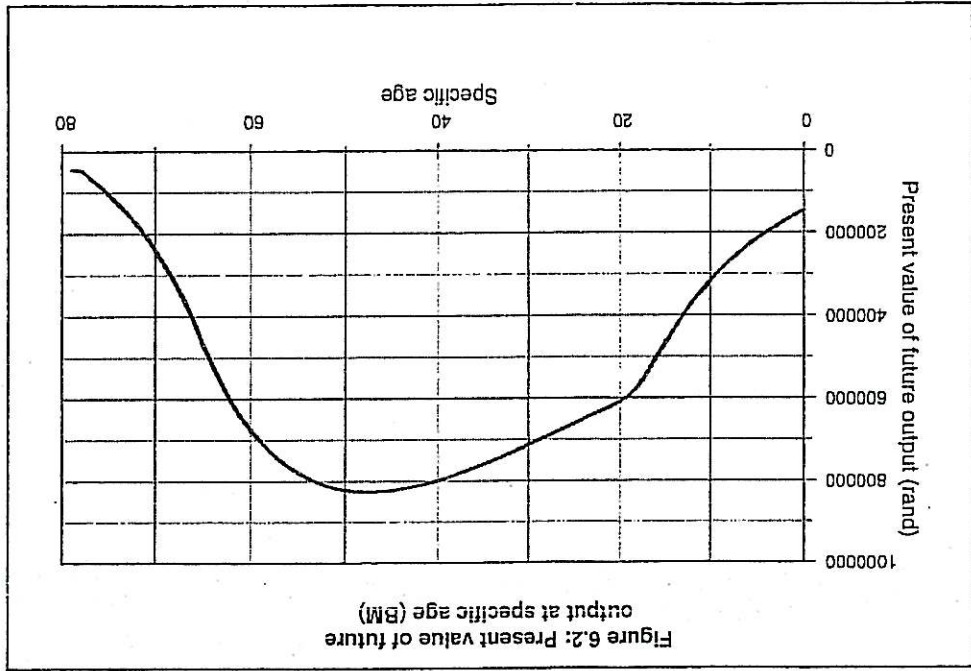
This method is explained further in Section 6.3 using actual values.

### 6.3 Calculation of loss of output

Figure 6.1 expresses the production cycle of an individual in proportion to GDP per capita. Figure 6.2 shows the present value of future output at any given age. In order to quantify future output, the following input values were used:

- GDP per capita in 1998 (in 1998 rand): R17 512
- real discount rate: 8 per cent per annum
- increase in productivity: 0 per cent per annum.

The calculation of the production value of a human life is shown in Table 6.1.



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Table 6.1: CB-Roads: Loss of output per fatality				
b	c	d	e	f
Age group	Percentage of fatalities	Average value of output	Loss of output	
8	1 - 5	2.2	172208	3789
9	6 - 10	3.9	253030	9868
10	11 - 15	3.5	371784	13012
11	16 - 20	7.9	536372	42373
12	21 - 25	17.0	631583	107369
13	26 - 30	16.4	682911	111997
14	31 - 35	13.9	732193	101775
15	36 - 40	9.3	776376	72203
16	41 - 45	8.9	810126	72101
17	46 - 50	5.9	825306	48693
18	51 - 55	3.6	809616	29146
19	56 - 60	3.1	744615	23083
20	61 - 65	1.9	602794	11453
21	66 - 70	1.3	368012	4784
22	71 - 75	0.9	179825	1618
23	76 - 80	0.3	68537	206
24	Total	100.0		653472



## 6.4 Discussion of results

6-4

The appeal of this method is that it seems to be based on sound principles. However, the value obtained for the cost of a fatality when a zero rate of increase in productivity is assumed, is higher than that obtained by the method used in Section 4. If the calculations are repeated using a two per cent rate of increase in productivity over the analysis period, as was done in this study, the difference in the results is more pronounced. It is therefore recommended that the CB-Roads method should not be used until the inherent problems with, *inter alia*, input values have been resolved.

These differences are highlighted in Table 6.1 when the outputs of the two methods are compared when identical input values are used.

Table 6.2: Comparison of the two methods		Item	Scenario
Input values		A	B
GDP per capita in 1998 (in 1998 rand)	17 512	17 512	17 512
Discount rate (% p.a. in real terms)	8	8	8
Increase in productivity (% p.a.)	0	0	2
Output: Loss of output per fatality (1998 rand)			
Method used in this study	194 414	276 615	236 524
CB-Roads method	276 615	653 472	

# 7 COMPARISON OF STUDY RESULTS WITH RESULTS FROM PREVIOUS STUDIES

## 7.1 Background

In this section key results from this study are compared with those from previous studies conducted by the CSIR (Transporek) in order to test for consistency and to identify possible patterns that are emerging over time. Authors of these previous reports and dates to which results apply respectively are given below.

- Cillie, 1972 (5)
- Cillie and Freeman, 1975 (6)
- Goosen, 1979 (7)
- Goosen and Kolman, 1980 (8)
- Verburgh, Farquharson and Hamilton, 1984 (9)
- Glass and Hamilton, 1986 (10)
- Morden, 1988 (11)
- de Haan, 1991 (2).

The aspects of the study results that were compared are:

- Total cost of collisions: All components
- Total cost of collisions: Loss of output
- Total cost of collisions: Vehicle damage
- Unit cost of collisions: Fatal collisions
- Unit cost of collisions: All collisions
- Total number of collisions.

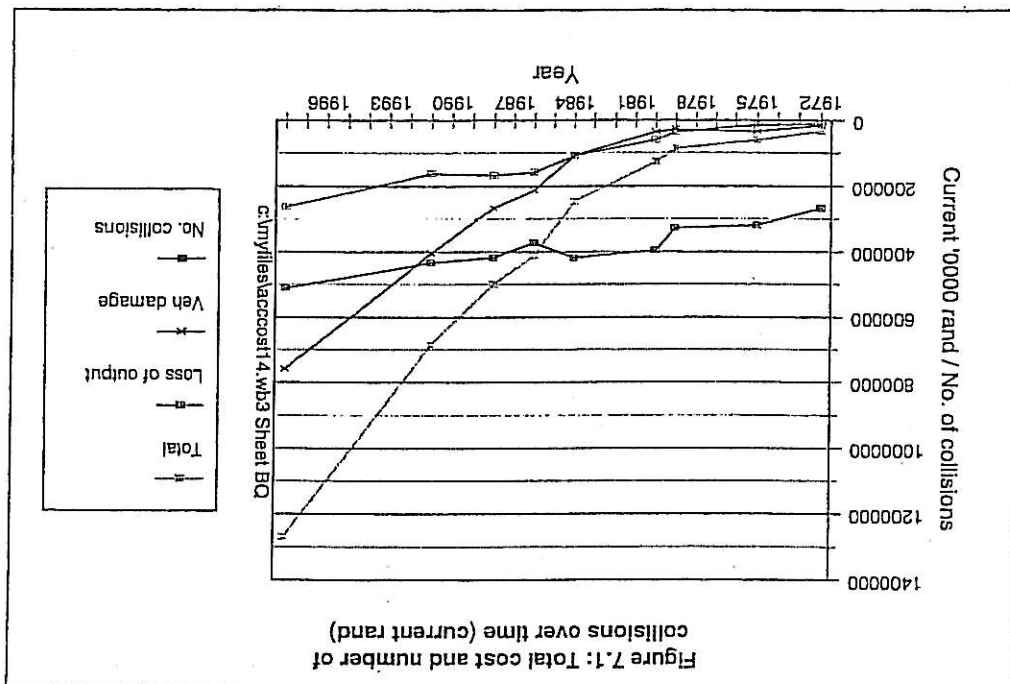
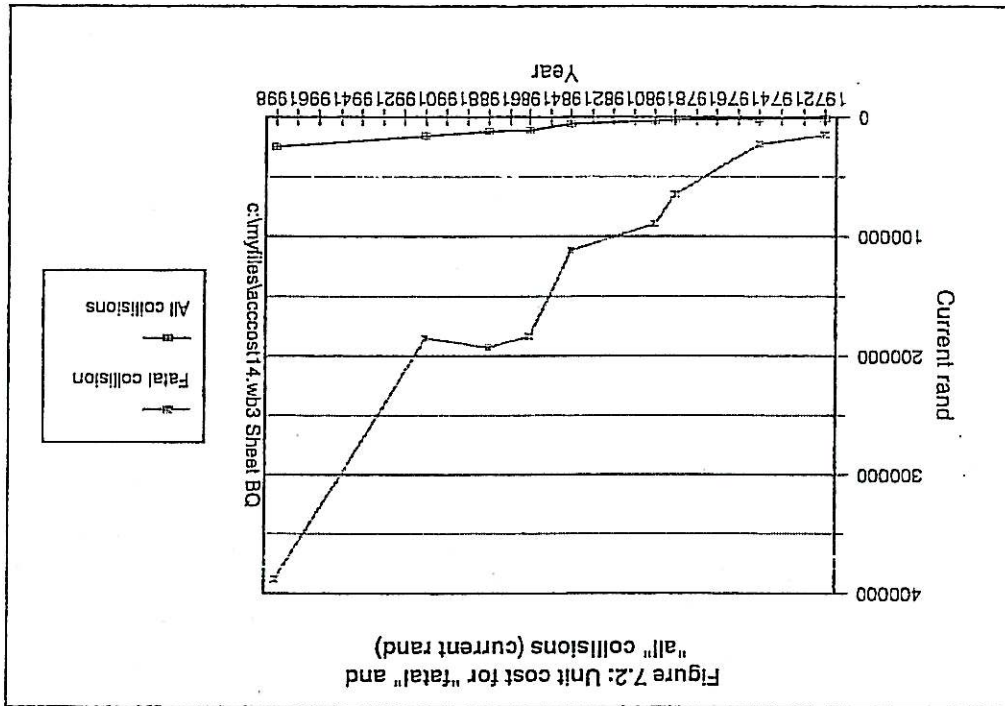
Costs are compared both in current rand and in constant 1998 rand. Results are given in Section 7.2.

## 7.2 Results of comparison

Results of the comparison are given in Table 7.1 and in Figures 7.1 and 7.2 for current rand, and in Table 7.2 and in Figures 7.3 and 7.4 for constant 1998 rand.

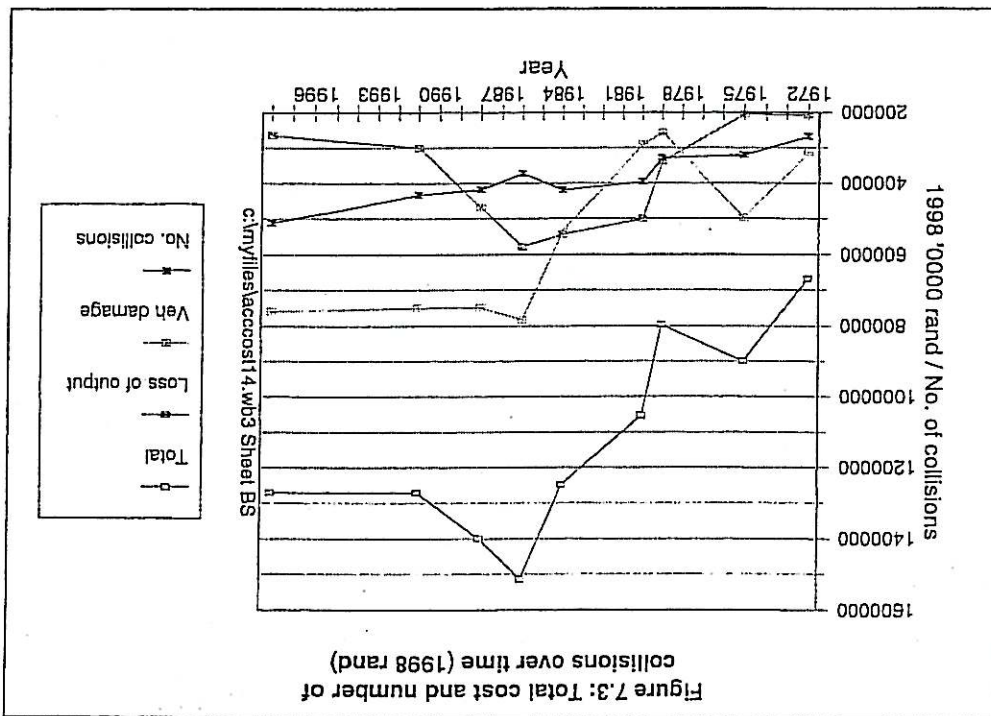
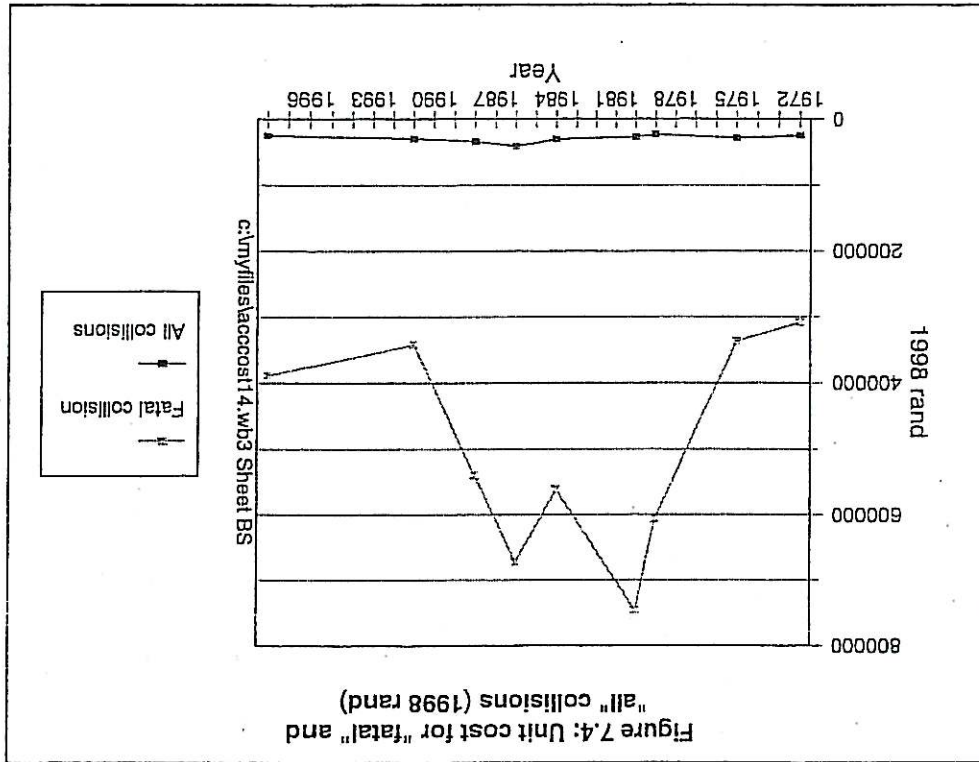
Both Figures 7.1 and 7.2 show that all items reveal a positive growth over time. However, the more important pictures emerges from Figures 7.3 and 7.4 where costs as expressed as constant 1998 rand. Figure 7.3 shows that are items except loss of output have increased relative to the 1991 figures. Figure 7.4 shows that the value for "all" collisions obtained in this study is more or less in line with corresponding figures from previous studies. The cost of a fatal accident, on the other hand, has increased by 13,7 percent in real terms relative to the previous study.

c:\myfiles\accost14.wb3 Sheet BQ													
Year	Author	Total cost ('0 000 rand)	Loss of Vehicle	Fatal	All	Total number of collisions	Year	Author	Total cost ('0 000 rand)	Loss of Vehicle	Fatal	All	Total number of collisions
b	c	d	e	f	g	h	i	j	k	l	m	n	o
9	1972	Cillie	32500	10100	15300	14980	1210	268400	10	1973			
11	1974								11	1974			
12	1975	Cillie and Freeman	61000	14000	33800	22820	1899	321200	12	1975			
13	1976								13	1976			
14	1977								14	1977			
15	1978								15	1978			
16	1979	Goosen	85300	36400	27600	64860	2410	329169	16	1979			
17	1980	Goosen and Kolman	126100	60000	34900	89359	3181	396546	17	1980			
18	1981								18	1981			
19	1982								19	1982			
20	1983								20	1983			
21	1984	Verburgh et. al.	248000	108200	106500	111478	5912	419494	21	1984			
22	1985								22	1985			
23	1986	Glass and Hamilton	413400	158300	213800	183571	11093	372668	23	1986			
24	1987								24	1987			
25	1988	Morden	499100	167500	266900	192504	11933	418269	25	1988			
26	1989								26	1989			
27	1990								27	1990			
28	1991	de Haan	686200	162400	404900	184604	15836	433287	28	1991			
29	1992								29	1992			
30	1993								30	1993			
31	1994								31	1994			
32	1995								32	1995			
33	1996								33	1996			
34	1997								34	1997			
35	1998	Schutte	1269672	264289	759231	388487	24817	511605	35	1998			



c:\myfiles\accost14.wb3 Sheet BS							
b	c	d	e	f	g	h	i
Year	Author	Total cost ('0 000 rand)	Total cost ('0 000 rand)	Loss of Vehicle	Fatal	All	Total number of collisions
7		Total	Loss of Vehicle	damage	collisions	collisions	
8		output	output	collisions	collisions	collisions	
9	1972	Cillie	667582	207464	314277	307704	24855
10	1973						268400
11	1974						
12	1975	Cillie and Freeman	899212	206376	498252	336394	27993
13	1976						321200
14	1977						
15	1978						
16	1979	Goosen	797619	340367	258081	606489	22535
17	1980	Goosen and Kolman	1053355	501200	291531	746446	26572
18	1981						396546
19	1982						
20	1983						
21	1984	Verburgh et. al.	1247968	544476	535922	560972	29750
22	1985						419494
23	1986	Glass and Hamilton	1514591	579970	783308	672557	40642
24	1987						372668
25	1988	Morden	1399043	469525	748156	539614	33450
26	1989						418269
27	1990						
28	1991	de Haan	1270027	300572	749394	341667	29309
29	1992						433287
30	1993						
31	1994						
32	1995						
33	1996						
34	1997						
35	1998	Schutte	1269672	264289	759231	388487	24817
							511605

Table 7.2: Comparison of results of previous studies (1998 rand)



## REFERENCES

- 1 Department of Transport. Methodology for the determination of the unit cost of road traffic collisions in South Africa as an input into economic evaluation. Project Report CR-99/009, Department of Transport, Pretoria, March 1999.
- 2 South African Roads Board. An estimate of the unit cost of road traffic collisions in South Africa for 1991. Project Report PR 91/113/1, South African Roads Board, Pretoria, March 1992.
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- 10 Glass, RD and Hamilton, CC. An estimate of the cost of road traffic accidents in South Africa, 1986. Technical Report RT-104, National Institute for Transport and Road Research, CSIR, Pretoria, 1987.
- 11 Morden, CH. An estimate of the cost of road traffic collisions in South Africa for 1988. Technical Report DPVT-64, Division of Roads and Transport Technology, CSIR, Pretoria, 1989.

**Appendix A.1**  
**Loss of output due to fatalities**



Table A.1.3: Annual income per person employed (rand) and unemployment rates (percentage) per population and age group										
c:\myfiles\accost14\wb3 Sheet H										
unemployment rates (percentage) per population and age group										
Table A.1.3: Annual income per person employed (rand) and unemployment rates (percentage) per population and age group										
Age group	b	c	d	e	f	g	h	i	j	k
7										
8	group	African	Coloured	Asian	White					
9	Income	Unemploy-	Income	Unemploy-	Income	Unemploy-	Income	Unemploy-	Income	Unemploy-
10	ment rate	ment rate	ment rate	ment rate	ment rate	ment rate	ment rate	ment rate	ment rate	ment rate
11	20-29	14564	55	18655	26	30789	16	46645	6	
12	30-39	18490	37	25002	16	45876	9	77887	4	
13	40-59	17477	32	24066	14	45392	9	88908	4	
14	60-65	14681	29	18429	12	41913	9	93672	23	

Table A.1.2: Remaining working life, discount rate and growth rate					
c:\myfiles\accost14\wb3 Sheet G					
Remaining working life (years)					
Age group	b	c	d	e	f
8	Average age	Working life: full	Working life: half		
9	0-19	10	45	23	
10	20-29	25	40	20	
11	30-39	35	30	15	
12	40-59	50	15	8	
13	60-65	63	2	1	
14	Discount and growth rates				
15	Discount rate (% per annum)			8	
16	Growth rate (% per annum)			2	

Table A.1.1: Percentage of population at a specific age that will die before the age of 65 from causes other than road traffic collisions					
c:\myfiles\accost14\wb3 Sheet F					
road traffic collisions					
Table A.1.1: Percentage of population at a specific age that will die before the age of 65 from causes other than road traffic collisions					
Specific age	b	c	d	e	f
8	10 (1)	1.07	1.05	0.63	0.52
9	20	40.58	40.03	31.11	20.30
10	25	34.61	33.17	20.81	11.40
11	35	32.71	33.88	26.36	16.64
12	50	28.48	29.15	26.94	17.48
13	63	6.68	6.69	6.78	4.43
14					

Table A.1.4: Classification of fatalities into relevant sub-groups by population and age group and status												
c:\myfiles\accost14.wb3 Sheet1												
7	Age			Drivers and passengers			Pedestrians			Total		
8	group	Fatal-	Early	Fatal-	Early	Fatal-	Early	Number	Number	Number	Total	
9	ties	death &	working	ties	death &	working	ties	working	working	working	Number	
10	unemploy	half life	full life	unemploy	half life	full life	unemploy	half life	full life	unemploy	full life	
11	ment			ment			ment			ment		
12	African											
13	0-19	253	3	3	437	5	5				5	
14		139	45	66	250	240	78	114	432			
15	20-29	1049	577	163	309	666	366	104	196	666		
16	30-39	864	320	178	366	500	275	74	151	500		
17	40-59	924	296	179	449	625	344	80	201	625		
18	60-65	40	12	2	27	36	20	1	15	36		
19	65+	121	121	0	121	106	106	0	0	106		
20	Total	3251	1467	567	1217	2370	1356	336	678	2370		
21	Coloured											
22	0-19	57	1	17	25	56	19	22	32	73		
23		15	15	17	25	56	19	22	32	73		
24	20-29	216	56	53	107	165	43	41	82	165		
25	30-39	122	32	31	60	120	19	34	67	120		
26	40-59	158	41	34	83	121	17	30	74	121		
27	60-65	9	2	0	6	5	1	0	4	5		
28	65+	28	28	0	28	15	15	0	0	15		
29	Total	590	175	135	280	590	115	127	258	500		
30	Asian											
31	0-19	17	0	0	0	8	0	0	0	0		
32		3	4	10	17	1	1	2	5	8		
33	20-29	113	17	30	66	86	13	15	58	86		
34	30-39	53	5	10	38	54	5	13	36	54		
35	40-59	82	7	20	55	82	4	10	26	39		
36	60-65	6	1	1	4	3	0	0	3	3		
37	65+	17	17	0	17	9	9	0	0	9		
38	Total	288	49	65	173	288	32	40	128	199		
39	White											
40	0-19	131	1	25	98	130	2	6	25	34		
41		8	8	25	98	130	2	6	25	34		
42	20-29	518	31	56	431	518	6	11	88	106		
43	30-39	311	12	50	249	311	3	11	53	66		
44	40-59	406	16	68	322	406	5	22	102	129		
45	60-65	30	7	1	22	30	3	0	9	12		
46	65+	91	91	0	91	36	36	0	0	36		
47	Total	1487	166	199	1122	1487	383	50	277	383		

Table A.1.5: Present worth of loss of output due to fatalities									
by population and age group and status									
c:\myfiles\accost14.wb3 Sheet J									
b	c	d	e	f	g	h	i	j	
Age group	Working	Working	Working	Sub-total	Working	Working	Sub-total	Total	
7	Drivers and passengers			Pedestrians			Total		
8	Working	half life	full life	Sub-total	Working	half life	full life	Sub-total	
9		half life	full life		half life	full life			
10	African								
11	0-19	4611692	8527168	13138860	7965649	14728745	22694395	35833255	
12	20-29	27564285	68656276	96210561	17493950	43589209	61083159	157293720	
13	30-39	32220824	94406113	126626937	13318793	39023691	52342484	178969421	
14	40-59	19511452	76867042	96378494	87333760	34407397	43141157	139519651	
15	60-65	26304	714530	740835	15005	407584	422589	1163423	
16	Sub-total	83924557	249171130	333095687	47527157	132156626	179683783	512779470	
17	Coloured								
18	0-19	2179454	4085251	6264705	2829467	5352751	8182218	1444623	
19	20-29	11453681	30433536	4188217	8749339	23247840	31997180	73884397	
20	30-39	7484703	20804512	28289215	8356869	23228786	31585655	59874870	
21	40-59	5117209	19511806	24629014	4554368	17365707	21920076	46549090	
22	60-65	7755	210318	218073	5123	138949	144072	362145	
23	Sub-total	26242802	75045423	101288225	24495166	69334033	93829200	195117425	
24	Asian								
25	0-19	964536	2697109	3661645	453899	1269228	1723127	5384772	
26	20-29	10653979	31113536	41767515	5293486	27391576	32685062	74452577	
27	30-39	4398227	24579046	28977273	5816088	23141572	28957661	57934933	
28	40-59	5570341	24412555	29982896	2707602	11519401	14227002	44209898	
29	60-65	58226	307039	365264	7327	195881	203208	568472	
30	Sub-total	21645309	83109285	104754594	14278402	63517658	77796060	182550653	
31	White								
32	0-19	8140985	31962390	40103375	2112927	8295582	10408510	50511884	
33	20-29	29983784	307324134	337307918	6135678	62888722	69024400	406332318	
34	30-39	37871701	270217015	308088716	8037081	57345090	65382171	373470887	
35	40-59	37790390	279873784	317664174	12007292	88925414	100932706	418596880	
36	60-65	90532	3797653	3888185	36213	1519061	1555274	5443459	
37	Sub-total	113877392	893174975	1007052368	28329191	218973870	247303060	1254355428	
38	All								
39	Total	245690060	1300500813	1546190873	*****	483982187	598612103	2144802976	

Table A.1.6: Unit cost of loss of output due to fatalities			
c:\myfiles\accost14.wb3 Sheet K			
b	c	d	e
6	Item	Drivers and	Pedestrians
7		passengers	
8	Present worth of loss of output	1546190873	598612103
9	Number of fatalities	5616	3452
10	Cost per fatality	275319	173410
11	Number of fatalities per fatal collision	1.479	0.997
12	Cost per collision	407214	172859
			295427
			All
			f

**Appendix A.2**  
**Loss of output due to serious injuries**

Table A.2.1: Specific assumptions regarding loss of output in case of serious injury collisions		c:\myfiles\accost14.wb3 Sheet O	
b	c	d	e
7	Description	Value	
8		Number	Unit
9	% of seriously injured suffering permanent (partial) disability	10	%
10	Number of days sick leave (non-permanent serious injury)	29	days
11	% of potential income generated by partially disabled	50	%
12	Number of work days per annum	261	days

Table A.2.2: Income by population and age group (rand)		c:\myfiles\accost14.wb3 Sheet P	
b	c	d	e
7	Age group	Population group	
8		African	Coloured
9		Asian	White
9	20-29	55.80	71.48
10	30-39	70.84	95.79
11	40-59	66.96	92.21
12	60-65	56.25	70.61
			160.59
			358.90
			178.72
			298.42
			340.64

Table A.2.3: Classification of the seriously injured into relevant

sub-groups by population and age group and status

c:\myfiles\accost14.wb3 Sheet R

b	c	d	e	f	g	h	i	j	k	l	m	n	o	Pedestrians		Drivers and passengers		Total
														Number disabled	Number	Number disabled	Number	
7	Age													Total			Total	
8	group	Serious		Number disabled		Total		Serious		Number disabled		Total				Total		
9		Injures		not		Die		Full		Injures		not		Die		Full		
10		disabled		before		before		before		disabled		before		before				
11				20		65												
12	African																	
13	0-19	871	784	1	35	51	871	1380	1242	1	56	81	1380					
14	20-29	5781	5203		200	378	5781	1969	1772		68	129	1969					
15	30-39	4208	3787		138	283	4208	1468	1321		48	99	1468					
16	40-59	2635	2372		75	188	2635	1044	940		30	75	1044					
17	60-65	207	186		1	19	207	111	100		1	10	111					
18	Total	13702	12332	1	449	920	13702	5972	5375	1	203	393	5972					
19	Coloured																	
20	0-19	230	230	0	10	15	230	275	248	0	11	16	275					
21	20-29	883	795		29	59	883	336	302		11	22	336					
22	30-39	542	488		18	36	542	200	180		7	13	200					
23	40-59	306	275		9	22	306	124	112		4	9	124					
24	60-65	23	21		0	2	23	12	11		0	1	12					
25	Total	2010	1809	0	67	134	2010	947	852	0	33	62	947					
26	Asian																	
27	0-19	81	73	0	3	6	81	72	65	0	2	5	72					
28	20-29	473	426		10	38	473	162	146		3	13	162					
29	30-39	201	181		5	15	201	119	107		3	9	119					
30	40-59	240	216		6	18	240	92	83		2	7	92					
31	60-65	25	23		0	2	25	12	11		0	1	12					
32	Total	1020	918	0	24	78	1020	457	411	0	11	34	457					
33	White																	
34	0-19	687	618	0	14	54	687	167	150	0	3	13	167					
35	20-29	2506	2255		29	222	2506	335	302		4	30	335					
36	30-39	1466	1319		24	122	1466	191	172		3	16	191					
37	40-59	927	834		16	76	927	157	141		3	13	157					
38	60-65	92	83		0	9	92	28	25		0	3	28					
39	Total	5678	5110	0	84	484	5678	878	790	0	13	74	878					

Table A.2.4: Present worth of loss of output due to serious injury (partial disability) by population and age group and status									
c:\myfiles\accost14.wb3 Sheet 5									
b	c	d	e	f	g	h	i	Total	
Age	Drivers and passengers			Pedestrians			Total		
7	Working	Working	Working	Sub-total	Working	Working	Working	Sub-total	
8	group	half life	full life		half life	full life			
9									
10	African								
11	0-19	813166	1476495	2289661	1288369	2339338	3627706	5917367	
12	20-29	7592532	18918109	26510641	2586005	6443480	9029485	35540126	
13	30-39	7846367	22989637	30836004	2737278	8020149	10757427	41593431	
14	40-59	2782071	10960209	13742280	1102270	4342489	5444759	19187039	
15	60-65	6806	184885	191691	3650	99141	102791	294482	
16	Sub-total	19040943	54529335	73570277	7717572	21244596	28962169	102532446	
Coloured									
17	0-19	496602	923017	1419618	533459	991522	1524981	2944599	
18	20-29	2341111	6220558	8561670	890842	2367053	3257895	11819564	
19	30-39	1887260	5245834	7133094	696406	1935732	2632138	9765232	
20	40-59	575883	2195829	2771712	233364	889813	1123177	3894889	
21	60-65	1178	31958	33137	615	16674	17289	50425	
22	Sub-total	5302034	14617197	19919230	2354686	6200794	8555479	28474710	
Asian									
23	0-19	231502	641425	872927	205780	570155	775935	1648862	
24	20-29	1455709	7532683	8988392	498573	2579904	3078477	12066869	
25	30-39	1082439	4306904	5389342	640847	2549858	3190705	8580048	
26	40-59	833108	3544431	4377539	319358	1358699	1678057	6055596	
27	60-65	3053	81617	84670	1465	39176	40642	125312	
28	Sub-total	3605811	16107060	19712870	1666023	7097793	8763815	28476686	
White									
29	0-19	2146553	10572678	12719230	521797	2570069	3091865	15811096	
30	20-29	7252834	74339216	81592050	969553	9937605	10907158	92499208	
31	30-39	8926031	63687804	72613836	1162941	8297661	9460602	82074438	
32	40-59	4314248	31951108	36265356	730676	5411353	6142029	42407385	
33	60-65	13882	582307	596188	4225	177224	181449	777637	
34	Sub-total	22653547	181133113	203786660	3389192	26393911	29783103	233569763	
All									
35	Total	50602335	266386704	316989038	15127472	60937093	76064566	393053604	



Table A.2.5: Loss of output due to serious injury									
(non-permanent) by population and age group and status									
c:\myfiles\accost14.wb3 Sheet U									
b	c	d	e	f	g	h	i	j	
Age	Drivers and passengers			Pedestrians			Total		
group	Serious	Number	Income	Serious	Number	Income	income		
9	injuries	working	lost	injuries	working	lost	lost		
10	African								
11	20-29	5781	2341	3788752	1969	797	1290443	5079195	
12	30-39	4208	2386	4901773	1468	832	1710029	6611802	
13	40-59	2635	1613	3131529	1044	639	1240727	4372256	
14	60-65	207	132	215767	111	71	115701	331468	
15	Sub-total	12831	6472	12037820	4592	2340	4356901	16394721	
16	Coloured								
17	20-29	883	588	1218955	336	224	463838	1682793	
18	30-39	542	410	1138291	200	151	420034	1558325	
19	40-59	306	237	633321	124	96	256640	889961	
20	60-65	23	18	37300	12	10	19461	56761	
21	Sub-total	1754	1253	3027867	672	480	1159972	4187840	
22	Asian								
23	20-29	473	362	1237872	162	124	423965	1661836	
24	30-39	201	165	839118	119	97	496791	1335909	
25	40-59	240	197	991361	92	75	380022	1371383	
26	60-65	25	20	95352	12	10	45769	141121	
27	Sub-total	939	743	3163703	385	307	1346547	4510250	
28	White								
29	20-29	2506	2120	10987883	335	283	1468851	12456734	
30	30-39	1466	1267	10961505	191	165	1428136	12389641	
31	40-59	927	801	7912101	157	136	1340021	9252122	
32	60-65	92	64	663572	28	19	201957	865529	
33	Sub-total	4991	4251	30525061	711	603	4438965	34964026	
34	All								
35	Total	20515	12720	48754451	6360	3730	11302385	60056836	

Table A.2.6: Loss of output due to serious injury (partial disability and non-permanent added) by population and age group and status

b	c	d	e	f	g	h	i	j	k	Pedestrians		All
										Total	Non-permanent	
7	Age group	Partially disabled		Non-permanent		Total		Partially disabled		Non-permanent		Total
		Working	half life	Working	half life	Working	half life	Working	half life			
8	group	Partially disabled		Non-permanent		Total		Partially disabled		Non-permanent		Total
9		Working	half life	Working	half life	Working	half life	Working	half life	Working	half life	
10		Working	half life	Working	half life	Working	half life	Working	half life	Working	half life	
11	African											
12	0-19	813166	1476495	3788752	2289661	1288369	2339338	1290443	10319928	40619321	5917367	5917367
13	20-29	7592532	18918109	3788752	30299393	2586005	6443480	1290443	10319928	40619321	5917367	5917367
14	30-39	7846367	22989637	4901773	3573777	2732278	8020149	1710029	12467456	48205234	48205234	48205234
15	40-59	2782071	10960209	3131529	16873809	1102270	4342489	1240727	6685486	23559295	23559295	23559295
16	60-65	6806	184885	215767	407458	3650	99141	115701	218492	625949	625949	625949
17	Sub-total	19040943	54529335	12037820	85608098	7717572	21244596	4356901	33319069	118927167	118927167	118927167
18	Coloured											
19	0-19	496602	923017	1419618	633459	591522	991522	1524981	2944599	2944599	2944599	2944599
20	20-29	2341111	6220558	1218955	9780625	890842	2367053	463838	3721733	13502357	13502357	13502357
21	30-39	1887260	5245834	1138291	8271385	696468	1935732	420034	3052171	11323556	11323556	11323556
22	40-59	575883	2195829	633321	3405033	233364	899813	256640	1379817	4784850	4784850	4784850
23	60-65	1178	31958	37300	70437	615	16674	19461	36750	107187	107187	107187
24	Sub-total	5302034	14617197	3027867	22947098	2354686	8200794	1159972	9715452	32662549	32662549	32662549
25	Asian											
26	0-19	231502	641425	872927	205780	570156	205780	775935	1648862	1648862	1648862	1648862
27	20-29	1455709	7532683	1237872	10226264	498573	2579904	423966	3502441	13728705	13728705	13728705
28	30-39	1082439	4306904	839118	6228460	640847	2549858	496791	3687496	9915957	9915957	9915957
29	40-59	833108	3544431	991361	5368900	319358	1356699	380022	2058078	7426979	7426979	7426979
30	60-65	3053	81617	180022	1465	39176	45769	86411	266433	266433	266433	266433
31	Sub-total	3605811	16107060	3163703	22876573	1666023	7097793	1346547	10110362	32986935	32986935	32986935
32	White											
33	0-19	2146553	10572678	12719230	521797	2570069	2570069	3091865	15811096	15811096	15811096	15811096
34	20-29	7252834	74339216	10987883	92579933	969553	9937605	1468851	12376009	104565942	104565942	104565942
35	30-39	8926031	63687804	10961505	83575340	1162941	8297661	1428136	10888738	94464078	94464078	94464078
36	40-59	4314248	31951108	7912101	44177457	730676	5411353	1340021	7482050	51659507	51659507	51659507
37	60-65	13882	582307	663572	1259761	4225	177224	201957	383405	1643166	1643166	1643166
38	Sub-total	22659547	181133113	30526081	234311721	3363152	23393011	4438965	34222069	268533789	268533789	268533789
39	All											
40	Total	50602335	266386704	48754451	365743490	15127472	60937093	11302385	87366950	453110440	453110440	453110440

Table A.2.7: Total loss of income due to serious injury											
c:\myfiles\accost14.wb3 Sheet Q											
b	c	d	e	f	g	h	i	Total			
6	Item	Driver and passenger			Pedestrian			Total			
7	No	Permanent	Sub-	No	Permanent	Sub-	Total				
8	permanent disability	total	permanent disability	total	permanent disability	total	Total				
9	disability										
10	Loss of income	48754451	316989038	365743496	11302385	76064566	87366950	453110440			
11	Number of casualties			26360			9886	36246			
12	Cost per casualty			13875			8837	12501			

**Appendix A.3**  
**Loss of output due to slight injuries**

Table A.3.1: Specific assumptions regarding loss of output	
in the case of slight injury collisions	
c:\myfiles\accost14.wb3 Sheet Z	
b	c
7	Description
8	Number
9	Unit
10	Number of days sick leave (non-permanent serious injury)
	Number of work days per annum
	261
	days
	6.5
	days
	Value
	d
	e

**Table A.3.2: Loss of output due to slight injury by population and age group and status**

c:\myfiles\accost14.wb3 Sheet Y									
b	c	d	e	f	g	h	i	j	
7	Age	Drivers and passengers		Pedestrians			Total		
8	group	Slight	Number	Income	Slight	Number	Income	Income	
9		injuries	working	lost	injuries	working	lost	lost	
10	African								
11	20-29	10192	4586	1663510	3022	1360	493243	2156753	
12	30-39	8727	5498	2531718	2247	1416	651859	3183576	
13	40-59	5085	3458	1505011	1604	1091	474737	1979748	
14	60-65	336	239	87222	178	126	46207	133429	
15	Sub-total	24340	13781	5787461	7051	3993	1666045	7453506	
16	Coloured								
17	20-29	2662	1970	915183	816	604	280537	1195720	
18	30-39	1934	1625	1011541	545	458	285052	1296592	
19	40-59	1048	901	540178	298	256	153600	693778	
20	60-65	79	70	31907	36	32	14540	46447	
21	Sub-total	5723	4565	2498808	1695	1350	733728	3232536	
22	Asian								
23	20-29	1460	1241	951569	447	380	291336	1242905	
24	30-39	771	702	801593	299	272	310864	1112458	
25	40-59	666	606	685122	222	202	228374	913496	
26	60-65	56	51	53193	21	19	19947	73140	
27	Sub-total	2953	2600	2491477	989	873	850522	3341999	
28	White								
29	20-29	8933	8397	9754458	828	778	904141	10658599	
30	30-39	5496	5276	10234244	528	507	963203	11217447	
31	40-59	3461	3323	7356759	434	417	922518	8279276	
32	60-65	368	283	661030	78	60	140110	801140	
33	Sub-total	18258	17279	28006491	1868	1762	2949971	30956462	
34	All								
35	Total	51274	38225	38784236	11603	7977	6200266	44984502	

Table A.3.3: Total loss of output due to slight injury			
c:\myfiles\accost14.wb3 Sheet AA			
b	c	d	e
6	Item	Driver and passenger	Pedestrian
7	Loss of income	38784236	6200266
8	Number of casualties	66462	17896
9	Cost per casualty	584	346
	Total		44984502
			84358
			533
			f

**Appendix A.4**  
**Loss of output: Summary**



**Table A.4.1: Loss of output distributed according to road collision severity**

		Cost per collision according to				injury severity		of		Total	
Collision		Fatal		Serious		Slight		Total		collisions	
severity		injury		injury		injury		Total		cost	
7		8		9		10		11		12	
8		9		10		11		12		13	
9		10		11		12		13		14	
10		11		12		13		14		15	
11		12		13		14		15		16	
12		13		14		15		16		17	
13		14		15		16		17		18	
14		15		16		17		18		19	
15		16		17		18		19		20	
16		17		18		19		20		21	
17		18		19		20		21		22	
18		19		20		21		22		23	
19		20		21		22		23		24	
20		21		22		23		24		25	
21		22		23		24		25		26	
22		23		24		25		26		27	
23		24		25		26		27		28	
24		25		26		27		28		29	
25		26		27		28		29		30	
26		27		28		29		30		31	
27		28		29		30		31		32	
28		29		30		31		32		33	
Fatal		172859	212	3	173074	3463	599354618	Pedestrians			
Serious		8705	5	8710	9952	86678829	Drivers and passengers				
Slight				342	17952	6145179	Total				
Damage only		172859	8917	349	182126	6989	Sub-total				
Sub-total		345719	17834	699	364252	38356	All				
Fatal		295427	10783	343	306553	7260	Total				
Serious		17627	235	17861	21265	379819537	Sub-total				
Slight				720	52097	37500239	Damage only				
Damage only						430983	Total				
Sub-total		295427	28409	1298	325134	511605	Sub-total				
Total		752933	65164	2788	820884	511605	Total				

Appendix B  
Vehicle damage

c:\myfiles\accost14.wb3 Sheet BK

**Table B.2: Relative distribution of cost per collision severity**

b	c	d	e	f
6	Collision severity	Drivers and passengers	Pedestrians	All
7	Fatal	5.84018	2.20108	1.84400
8	Serious	2.23218	1.46653	0.91300
9	Slight	1.61326	0.73283	0.74400
10	Damage only	0.85630	0.00000	0.19900
11	Total	1.00000	1.00000	1.00000

c:\myfiles\accost14.wb3 Sheet BJ

**Table B.1: Input values for vehicle damage: Set 1**

b	c	d	e	f	g	h	i	j	
6	Item	Vehicle type							
7		Car	LDV	Minibus	HCV	Artic ve	Bus	M cycle	
8	Drivers and passengers								
9	% of vehicles suffering 100% damage	50	50	50	50	50	50	50	
10	% damage that balance suffers	50	50	50	50	50	50	50	
11	Pedestrians								
12	% of vehicles that suffer more damage	50	50	50	50	50	50	50	
13	% damage that these vehicle suffer	25	25	25	0	0	0	25	
14	% damage that balance suffers	12.5	12.5	12.5	0	0	0	12.5	
15	Relative distribution of cost per vehicle	0.7584	0.7536	1.2480	3.6115	3.9895	3.6498	0.4411	

c:\myfiles\accost14.wb3 Sheet AD								
b	c	d	e	f	g	h	i	
6	Vehicle	"Full" damage	Less than full damage	Total cost				Total cost
7	type	Number of	Cost per	Total	Number of	Cost per	Total	
8		vehicles	vehicle	cost	vehicles	vehicle	cost	
9	Drivers and passengers							
10	Motor car	259568	10118	262297074	259568	5059	1313148537	
11	LDV	67771	10194	690864251	67771	5097	345432126	
12	Mini-bus	32097	17145	550316331	32097	8573	275158166	
13	HCV	21240	47783	1014916580	21240	23892	507458290	
14	Artic veh	1203	52649	63336925	1203	26325	31668462	
15	Bus	4409	49625	218798237	4409	24813	109399118	
16	Motor cycle	4288	5890	25251948	4288	2945	12625974	
17	Sub-total	390575		5189781346	390575		2594890673	
18	Pedestrians							
19	Motor car	11322	2529	28637604	11322	1265	14318802	
20	LDV	3020	2549	7696601	3020	1274	3848301	
21	Mini-bus	2758	4286	11821762	2758	2143	5910881	
22	HCV	506	0	0	506	0	0	
23	Artic veh	26	0	0	26	0	0	
24	Bus	238	0	0	238	0	0	
25	Motor cycle	192	1472	282704	192	736	141352	
26	Sub-total	18061		48438672	18061		24219336	
27	All							
28	Motor car	270890	9801	2654934678	270890	4900	1327467339	
29	LDV	70791	9868	698560852	70791	4934	349280426	
30	Mini-bus	34855	16128	562138094	34855	8064	281069047	
31	HCV	21746	46671	1014916580	21746	23336	507458290	
32	Artic veh	1229	51556	63336925	1229	25778	31668462	
33	Bus	4647	47089	218798237	4647	23544	109399118	
34	Motor cycle	4460	5700	25534652	4460	2850	12767326	
35	Total	408636	12923	5298220018	408636		2619110009	

Table B.3: Average damage to vehicles by vehicle type

Table B.4: Distribution of vehicle damage costs according to collision severity and status						
c:\myfiles\accost14.wb3 Sheet AG						
b	c	d	e	f	g	h
7	Collision	Number of	Cost per	Total cost	Number of	Cost per
8	severity	vehicles	vehicle		collisions	collision
9	Drivers and passengers					
10	Fatal	5525	50196	277334411	3797	73040
11	Serious	17897	20982	375513048	11313	33193
12	Slight	55520	15164	841917244	34145	24657
13	Damage only	749238	8049	6030611080	423994	14223
14	Sub-total	828180	9400	7784672019	473249	16449
15	Pedestrians					
16	Fatal	3452	4184	14443263	3463	4171
17	Serious	9886	2788	27559433	9952	2769
18	Slight	17896	1393	24929750	17952	1389
19	Damage only	6989	0	0	6989	0
20	Sub-total	38223	1901	72658007	38356	1894
21	All					
22	Fatal	8988	32463	291777675	7260	40190
23	Serious	27849	14473	403072481	21265	18955
24	Slight	73472	11798	866846994	52097	16639
25	Damage only	756227	7975	6030611080	430983	13993
26	Total	866536	9068	7857330027	511605	15358

**Appendix C**  
**Pain, suffering and loss of amenities of life**

Table C.1: Assumptions w.r.t. pain, suffering and loss of amenities of life			
c:\myfiles\accost14.wb3 Sheet B1			
b	c	d	e
Item	Injury severity		
6	Serious injury		
7	Slight injury		
8	Compensation per claim	15,182	2356

Table C.2: Pain, suffering and loss of amenities of life						
according to collision severity and status						
c:\myfiles\accost14.wb3 Sheet AH						
b	c	d	e	f	g	h
Collision		Cost per collision according to injury severity				
7	Collision	Fatal	Serious	Slight	Total	Number of collisions
8	severity	Drivers and passengers				
9						
10	Fatal	0	24706	2882	27588	3797
11	Serious	0	27083	1922	29004	11313
12	Slight	0		3628	3628	34145
13	Damage only	0			0	423994
14	Sub-total	0	51789	8432	60221	473249
15	Pedestrians					
16	Fatal	0	364	18	382	3463
17	Serious	0	14955	31	14986	9952
18	Slight	0		2328	2328	17952
19	Damage only	0			0	6989
20	Sub-total	0	15319	2376	17695	38356
21	All					
22	Fatal	0	13095	1516	14611	7260
23	Serious	0	21407	1037	22444	21265
24	Slight	0		3180	3180	52097
25	Damage only	0			0	430983
26	Total	0	34502	5733	40235	511605

Appendix D  
Hospital, medical and funeral costs



c:\myfiles\accost14.wb3 Sheet BB

**Table D.1: Assumptions w.r.t. hospital costs**

b	c	d	e
6	Injury severity	Percentage of victims hospitalised	Number of days spent in hospital
7	Fatal	18	1.5
8	Serious	80	17.5
9	Slight	60	1.5

c:\myfiles\accost14.wb3 Sheet BC

**Table D.2: Hospital costs**

b	c	d	e	f	g	h	i
6	Injury	Cost per	Drivers and passengers	Pedestrians	Total cost		
7	severity	casualty	Number	Cost	Number	Cost	
8	Fatal	1842	1011	1862041	621	1144545	3006586
9	Serious	4458	21088	94010304	7909	35257430	129267734
10	Slight	457	39877	18223880	10738	4907083	23130964
11	Total		61976	114096225	19268	41309059	155405284

c:\myfiles\accost14.wb3 Sheet BD

**Table D.3: Assumptions w.r.t. medical costs**

b	c	d	e
6	Injury severity	Percentage needing immediate	Percentage needing future
7		medical attention	medical attention
8	Fatal	5	0
9	Serious	100	39
10	Slight	30	0

c:\myfiles\accost14.wb3 Sheet BF

**Table D.4: Medical costs**

b	c	d	e	f	g	h	i	j	k
6	Injury	Medical	Future	Total	Drivers and passengers	Pedestrians	Total cost		
7	severity	cost per	medical	medical	Number	Cost	Number	Cost	
8		person	cost per	person					
9			person	person					
10	Fatal	772	0	714	281	200491	173	123236	323728
11	Serious	3684	0	3684	16080	59237246	6030	22216215	81453461
12	Serious	3684	10208	13892	10280	142815317	3856	53561162	196376478
13	Slight	678	0	678	19939	13518371	5369	3640046	17158417
14	Total					215771425		79540659	295312084

c:\myfiles\accost14.wb3 Sheet BF

**Table D.5: Assumptions w.r.t. funeral costs**

b	c	d
6	Item	Value
7	Average age of all road collision fatalities	29:50
8	Average age of all deaths	46:00
9	Average cost of a funeral	4209
10	Present value of funeral cost	1182
11	Funeral cost for the purpose of this study	3027

c:\myfiles\accost14.wb3 Sheet BG

**Table D.6: Funeral costs**

b	c	d	e	f	g	h
6	Cost per funeral	Drivers and passengers	Pedestrians	Total cost		
7	Number	Cost	Number	Cost		
8	3027	5616	16998570	3452	10448551	27447121

Table D.7: Hospital, medical and funeral costs: summary							
c:\myfiles\accost14.wb3 Sheet BH							
b	c	d	e	f	g	h	i
6	Injury	Hospital	Medical	Funeral	Total cost	Number of	Cost per
7	severity	cost	cost	cost		casualties	casualty
8	Drivers and passengers						
9	Fatal	1862041	200491	16998570	19061102	5616	3394
10	Serious	94010304	202052563	0	296062867	26360	11232
11	Slight	18223880	13518371	0	31742251	66462	478
12	Sub-total	114096225	215771425	16998570	346866220	98438	3524
13	Pedestrians						
14	Fatal	1144545	123236	10448551	11716333	3452	3394
15	Serious	35257430	75777376	0	111034807	9886	11232
16	Slight	4907083	3640046	0	8547130	17896	478
17	Sub-total	41309059	79540659	10448551	131298269	31234	4204
18	All						
19	Fatal	3006586	323728	27447121	30777435	9068	3394
20	Serious	129267734	277829940	0	407097674	36246	11232
21	Slight	23130964	17158417	0	40289381	84358	478
22	Total	155405284	295312084	27447121	478164489	129672	3687

Table D.8: Hospital, medical and funeral costs distributed according to collision severity and status							
c:\myfiles\accost14.wb3 Sheet AI							
b	c	d	e	f	g	h	i
7	Collision	Cost per collision according to injury severity	Number of	Total	collisions	cost	Total
8	severity	Fatal	Serious	Slight	Total		
9	Drivers and passengers						
10	Fatal	5020	18277	584	23882	3797	90679116
11	Serious		20036	390	20425	11313	231070120
12	Slight			736	736	34145	25115074
13	Damage only				0	423994	0
14	Sub-total	5020	38313	1709	45043	473249	346864310
15	Pedestrians						
16	Fatal	3383	269	4	3656	3463	12660966
17	Serious		11063	6	11070	9952	110165156
18	Slight			472	472	17952	8471191
19	Damage only				0	6989	0
20	Sub-total	3383	11333	482	15198	38356	131297314
21	All						
22	Fatal	4239	9688	307	14234	7260	103340083
23	Serious		15837	210	16047	21265	341236276
24	Slight			645	645	52097	33586265
25	Damage only				0	430983	0
26	Total	4239	25524	1162	30926	511605	478161624

**Appendix E**  
**Administration costs**

c:\myfiles\accost14.wb3 Sheet AZ

**Table E.1: Insurance administration costs**

b	c	d	e
6	Collision severity	Insurance	Percentage
7		administration cost	distribution
8		Drivers and passengers	
9	Fatal	5445131	0.99
10	Serious	14080339	2.56
11	Slight	50546219	9.19
12	Damage only	4308880389	78.94
13	Sub-total	500952078	91.08
14		<b>Pedestrians</b>	
15	Fatal	6215150	1.13
16	Serious	11880286	2.16
17	Slight	24860599	4.52
18	Damage only	6105147	1.11
19	Sub-total	49061183	8.92
20		<b>All</b>	
21	Fatal	11660281	2.12
22	Serious	25960626	4.72
23	Slight	75406818	13.71
24	Damage only	436985536	79.45
25	Total	550013261	100.00

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**Table E.2: Police costs: summary**

b	c	d	e	f	g
6	Collision	Cost per	Drivers and	Pedestrians:	Total cost
7	severity	collision	passengers:	Cost	
8			Cost		
9	Fatal	1640.00	6227080	5679320	11906400
10	Serious	1199.00	13564287	11932448	25496735
11	Slight	65.00	2219425	1166880	3386305
12	Damage only	32.00	13567808	223648	13791456
13	Total		35578600	19002296	54580896

Table E.3: Administration costs distributed according to collision severity and status						
c:\myfiles\accost14.wb3 Sheet AJ						
b	c	d	e	f	g	h
7	Collision	Administration costs			Number of	Cost per
8	severity	Insurance	Police	Total	collisions	collision
9	Drivers and passengers					
10	Fatal	5445131	6227080	11672211	3797	3074
11	Serious	14080339	13564287	27644626	11313	2444
12	Slight	50546219	2219425	52765644	34145	1545
13	Damage only	430880389	13567808	444448197	423994	1048
14	Sub-total	500952078	35578600	536530678	473249	1134
15	Pedestrians					
16	Fatal	6215150	5679320	11894470	3463	3435
17	Serious	11880286	11932448	23812734	9952	2393
18	Slight	24860599	1166880	26027479	17952	1450
19	Damage only	6105147	223648	6328795	6989	906
20	Sub-total	49061183	19002296	68063479	38356	1775
21	All					
22	Fatal	11660281	11906400	23566681	7260	3246
23	Serious	25960626	25496735	51457361	21265	2420
24	Slight	75406818	3386305	78793123	52097	1512
25	Damage only	436985536	13791456	450776992	430983	1046
26	Total	550013261	54580896	604594157	511605	1182

Appendix F  
Legal costs

c:\myfiles\accost14.wb3 Sheet AS

**Table F.1: Assumptions regarding legal costs w.r.t. motor vehicle claims**

b	c	d
6	Collision	Percentage of road collisions that involve legal costs
7	severity	w.r.t. motor vehicle claims
8	Fatal	10.0
9	Serious	6.6
10	Slight	3.6
11	Damage only	2.5

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**Table F.2: Legal costs in respect of motor vehicle claims**

b	c	d	e	f	g	h
6	Collision	Cost per	Number of	Total cost	Number of	Cost per
7	severity	vehicle	vehicles		collisions	collision
8	<b>Drivers and passengers</b>					
9	Fatal	3688	553	2037620	3797	537
10	Serious	3851	1181	4548809	11313	402
11	Slight	2992	1999	5980170	34145	175
12	Damage only	4220	18731	79044609	423994	186
13	Sub-total		22463	91611208	473249	194
14	<b>Pedestrians</b>					
15	Fatal	0	345	0	3463	0
16	Serious	0	652	0	9952	0
17	Slight	0	644	0	17952	0
18	Damage only	0	175	0	6989	0
19	Sub-total		1817	0	38356	0
20	<b>All</b>					
21	Fatal	2270	898	2037620	7260	281
22	Serious	2481	1834	4548809	21265	214
23	Slight	2263	2643	5980170	52097	115
24	Damage only	4181	18906	79044609	430983	183
25	Total		24280	91611208	511605	179



Table F.3: Legal costs in respect of RAF claims						
c:\myfiles\accost14.wb3 Sheet AU						
b	c	d	e	f	g	h
Injury severity	Legal cost	Percentage	Number	Number	Total cost	Number of casualties
6	7	8	9	10	11	12
Drivers and passengers						
9	Fatal	8064	2.9%	878	7080192	5616
10	Serious	9913	46.1%	13291	136710183	26360
11	Slight	3047	13.1%	3940	12005180	66462
12	Damage only	0	0.0%	0	0	0
13	Sub-total		62.30	18609	155795555	98438
Pedestrians						
14	Fatal	8064	2.7%	818	6596352	3452
15	Serious	9913	28.8%	8612	85370756	9886
16	Slight	3047	6.1%	1831	5579057	17896
17	Damage only	0	0.0%	0	0	0
18	Sub-total		37.70	11261	97546165	31234
19	Sub-total		100.00	29870	253341720	129672
20	All					
21	Fatal	8064	5.6%	1696	13676544	9068
22	Serious	9913	75.0%	22403	222080939	36246
23	Slight	3047	19.3%	5771	17584237	84358
24	Damage only	0	0.0%	0	0	0
25	Total		100.00	29870	253341720	129672
ERR						1583
ERR						181
ERR						5186
ERR						1261
ERR						1911
ERR						8636
ERR						312
ERR						3123
ERR						1508
ERR						6127
ERR						208
ERR						1954

Table F.4: Assumptions regarding medico-legal costs						
c:\myfiles\accost14.wb3 Sheet AV						
b	c	d	e	Injury severity		
Item	Percentage of injured requested to submit a medico-legal report					
6	19.2%					
7	19.2%					
8	19.2%					

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**Table F.5: Medico-legal costs**

b	c	d	e	f	g	h	i
6	Injury	Filing in RAF form	Cost per claim	Number	Cost	Cost per claim	Total cost
7	severity	Cost per claim	Number	Cost	Cost per claim	Number	Cost
8							
9							
10	Serious	102	13791	1406682	1473	2648	3900315
11	Slight	102	3940	401880	824	63	51945
12	Sub-total		17731	1808562		2711	3952260
13							5760822
14	Serious	102	8612	878424	1473	1654	2435611
15	Slight	102	1831	186762	824	29	24140
16	Sub-total		10443	1065186		1683	2459751
17							3524937
18	Serious	102	22403	2285106	1473	4301	6335927
19	Slight	102	5771	588642	824	92	76085
20	Total		28174	2873748		4394	6412012
							9285760

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**Table F.6: Medico-legal cost per casualty**

b	c	d	e	f
6	Injury severity	Total cost	Number of casualties	Cost per casualty
7				
8	Serious	5306997	26360	201
9	Slight	453825	66462	7
10	Sub-total	5760822	92822	62
11				
12	Serious	3314035	9886	335
13	Slight	210902	17896	12
14	Sub-total	3524937	27782	127
15				
16	Serious	8621033	36246	238
17	Slight	664727	84358	8
18	Total	9285760	120604	77

Table F.7: RAF legal costs and medico-legal costs according to road collision severity						
c:\myfiles\accost14.wb3 Sheet AY						
b	c	d	e	f	g	h
7	Collision	Cost per collision according to injury severity	Number of collisions	Total cost		
8	severity	Fatal	Serious	Slight	Total	collisions
9	Drivers and passengers					
10	Fatal	1865	8767	229	10861	3797
11	Serious		9611	153	9764	11313
12	Slight			289	289	34145
13	Sub-total	1865	18378	671	20914	423994
14	Pedestrians					
15	Fatal	1905	215	2	2122	3463
16	Serious		8836	4	8841	9952
17	Slight			320	320	17952
18	Sub-total	1905	9051	326	11283	6989
19	All					
20	Fatal	1884	5490	139	7513	7260
21	Serious		8975	95	9070	21265
22	Slight			292	292	52097
23	Total	1884	14465	526	16875	430983

Table F.8: Legal costs distributed according to collision severity and status

collision severity and status						
c:\myfiles\accost14.wb3 Sheet AK						
b	c	d	e	f	g	h
Collision severity	Legal costs			Number of collisions	Cost per collision	
8	Motor	RAF and	medico-	Total	collisions	collision
9	vehicle		legal			
10						
11	Drivers and passengers					
12	Fatal	2037620	41240937	43278557	3797	11398
13	Serious	4548809	110456888	115005697	11313	10166
14	Slight	5980170	9857802	15837972	34145	464
15	Damage only	79044609	0	79044609	423994	186
16	Sub-total	91611208	161555628	253166836	473249	535
17	Pedestrians					
18	Fatal	0	7349336	7349336	3463	2122
19	Serious	0	87982602	87982602	9952	8841
20	Slight	0	5738517	5738517	17952	320
21	Damage only	0	0	0	6989	0
22	Sub-total	0	101070455	101070455	38356	2635
23	All					
24	Fatal	2037620	54543981	56581601	7260	7794
25	Serious	4548809	192869395	197418204	21265	9284
26	Slight	5980170	15212806	21192976	52097	407
27	Damage only	79044609	0	79044609	430983	183
28	Total	91611208	262626182	354237390	511605	692

Appendix G  
Miscellaneous costs

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**Table G.1: Cost of loss of time by collision severity and status**

b	c	d	e	f	g
Collision	Days lost	Number of	Weighted	Total	
severity	per collision	collisions	income	cost	
			per day		
8					
<b>Drivers and passengers</b>					
10	Fatal	3797	118	1343745	
11	Serious	11313	118	2669088	
12	Slight	34145	118	4027933	
13	Damage only	423994	118	25008336	
14	Sub-total	473249		33049101	
<b>Pedestrians</b>					
15		3463	118	1225544	
16	Fatal	9952	118	2347986	
17	Serious	17952	118	2117717	
18	Slight	6989	118	412231	
19	Damage only	38356		6103477	
20	Sub-total	511605		39152578	
21	All				
22	Fatal	7260	118	2569289	
23	Serious	21265	118	5017073	
24	Slight	52097	118	6145650	
25	Damage only	430983	118	25420566	
26	Total				

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**Table G.2: Average towing costs**

b	c	d
Vehicle type	Towing costs	
7	Motor car	665
8	Light delivery vehicle	1021
9	Minibus	1315
10	Heavy commercial vehicle	4192
11	Articulated vehicle	11074
12	Bus	11074
13	Motor cycle	332

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**Table G.3: Towing costs due to road collisions**

b	c	d	e	f	g
Collision	Percentage	Weighted	Number of	Total cost	
severity	of vehicles	average	vehicles		
	that needed	towing cost			
	towing				
10	<b>Drivers and passengers</b>				
11	Fatal	100	1494	8254350	
12	Serious	80	1213	17367249	
13	Slight	40	1090	24206720	
14	Damage only	20	1136	170226874	
15	Sub-total			220055192	
16	<b>Pedestrians</b>				
17	Fatal	0	1494	0	
18	Serious	0	1213	0	
19	Slight	0	1090	0	
20	Damage only	0	1136	0	
21	Sub-total			0	
22	<b>All</b>				
23	Fatal	100	1494	8254350	
24	Serious	80	1213	17367249	
25	Slight	40	1090	24206720	
26	Damage only	20	1136	170226874	
27	Total			220055192	

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**Table G.4: Other miscellaneous costs**

b	c	d	e	f	g	h	i
Collision	Costs per	Drivers and passengers	Number of	Sub-total	Number of	Pedestrians	Total
severity	collision	Sub-total	collisions		Sub-total	collisions	
9	Fatal	369	3797	1401093	3463	1277847	2678940
10	Serious	185	11313	2092905	9952	1841120	3934025
11	Slight	97	34145	1263365	17952	664224	1927589
12	Damage only	18	423994	7631892	6989	125802	7757694
13	Total		473249	12389255	38356	3908993	16298248

Table G.5: Miscellaneous costs distributed according to collision severity and status										
c:\myfiles\accost14.wb3 Sheet AL										
b	c	d	e	f	g	h	i			
7	Collision	Miscellaneous costs					Number of	Cost per		
8	severity	Time lost	Towing	Other	Total	collisions	collision			
9	Drivers and passengers									
10	Fatal	1343745	8254350	1401093	10999188	3797	2897			
11	Serious	2669088	17367249	2092905	22129242	11313	1956			
12	Slight	4027933	24206720	1263365	29498018	34145	864			
13	Damage only	25008336	170226874	7631892	202867101	423994	478			
14	Sub-total	33049101	220055192	12389255	265493549	473249	561			
Pedestrians										
15	Fatal	1225544	0	1277847	2503391	3463	723			
16	Serious	2347986	0	1841120	4189106	9952	421			
17	Slight	2117717	0	664224	2781941	17952	155			
18	Damage only	412231	0	125802	538033	6989	77			
19	Sub-total	6103477	0	3908993	10012470	38356	261			
All										
21	Fatal	2569289	8254350	2678940	13502579	7260	1860			
22	Serious	5017073	17367249	3934025	26318347	21265	1238			
23	Slight	6145650	24206720	1927589	32279959	52097	620			
24	Damage only	25420566	170226874	7757694	203405134	430983	472			
25	Total	39152578	220055192	16298248	275506019	511605	539			