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"Evaluation of the Burden of Road Traffic Injuries (RTIs) in Mauritius"

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Contents

Abstract	262
Acknowledgement	262
Chapter 1: Introduction	263
1.1 Introduction	263
1.2 Background	263
1.3 Purpose and Scope of Thesis	264
1.4 Structure of Thesis	264
Chapter 2: Research Methodology	265
2.1 Research Aims	265
2.2 Research Methods	265
2.3 Research Tool	265
2.4 Pilot Study	266
2.5 Operationalizing the Questionnaire	266
Chapter 3: The Road Safety Situation In Mauritius	268
3.1 Introduction	268
3.2 Materials and Methods	268
3.3 Results	269
3.4 Comparison With Other Developing And Developed Countries	274
3.5 Discussion	275
Chapter 4: Status Of Road Safety Interventions	275
4.1 Development of Road Safety Measure	275
4.2 The National Road Safety Council	275
4.3 Legislation To Promote Road Safety In Mauritius	276
4.4 Road Safety Intervention – Engineering Approach	276
4.5 Road Safety Intervention – Education Approach	277
4.6 Road Safety Intervention – Enforcement Approach	277
4.7 Strength and Weaknesses In Road Safety	278
4.8 Discussions	278
Chapter 5: The Research Survey	279
5.1 General	279
5.2 Administering And Distributing The Questionnaire	279
5.3 Collecting The Questionnaire	279
5.4 Response Rate	279
5.5 Representing The Data	279
5.6 Problems Encountered During The Survey	279

Chapter 6: Analysis And Discussion Of Survey Results	280
6.1 Data Analysis	280
6.2 Personal Background Of Respondents	280
6.3 Findings Of The Survey	280
Chapter 7: Conclusion And Recommendations	293
7.1 Conclusion	293
7.2 Recommendations	293
References	294
Appendices	295

Abstract

Road traffic injuries affect the economy, health and quality of life of people in Mauritius. Current road safety programs are inadequate and inefficient given the magnitude of the problem. Data reported on road traffic crashes in the period 1992-2002 from the Central Statistics Office, the Police Road Safety Unit and the Ministry of Health were reviewed. The burden of road traffic injuries in Mauritius is rising, with at least three people killed weekly. The age group most affected is 21-40 years followed by 41-50 years.

The main purpose of this study is to present the road traffic injury problem in Mauritius. With a view to identify priority target groups which might be considered in order to shape future safety interventions. Absolute number of crashes, fatalities and injuries, as well as fatality rates per 100,000 population and 10,000 vehicles were as indices to measure trends.

Moreover, a research survey was undertaken to measure current status regarding public's attitudes, knowledge and self-reported behaviour related to road safety and road safety interventions.

The major findings of the research are as follows:

- Compared to other categories of road users, pedestrian have been most frequently injured and killed on roads in Mauritius.
- Despite all the efforts, road traffic injuries still pose a major threat to the well-being of the Mauritian society. There is still a high rate of crashes, injuries and fatalities per 100,000 population.
- 72% of the respondents described that road travel in Mauritius as "fairly safe".
- Excessive speed and drink driving are widely acknowledged as a major contributing factor to road accidents and were mentioned as such by 91% and 89% of the respondents.

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Chapter 1: Introduction

1.1 Introduction

Death and injuries as a result of road traffic accidents is a recognized global problem and authorities are aware of the consequences this global phenomenon might lead to. The road accident phenomenon affects all countries in the world, but industrialized and developing countries in a different proportion.

Road traffic injuries are a major cause of morbidity and mortality worldwide. Low and Middle-income countries account for more than 85% of the deaths and up to 90% of the disability-adjusted life years (DALYs) lost globally. At the current state, it is projected that road traffic disability-adjusted life years lost will move from being the ninth leading cause of DALYs in 1999 to the third leading cause by 2020.

The rising trend in morbidity and mortality rates due to road traffic injuries in low and middle income countries has moved some to declare road traffic injuries an "epidemic", describing it as a "war on the roads".

Losses incurred as a result of road traffic injuries are not spread evenly among the countries of the world. The less developed countries, which have much lower levels of motorization compared to the industrialized countries, bear the brunt of the fatalities and accidents in terms of vehicle population. An estimated 70% of the world's road accident fatalities and injuries are concentrated in developing countries. Mauritius, being a developing country is no exception. Although it is still in its developmental stages of social and economic growth, its level of motorization is generally higher than compared to other African countries. The pace of motorization is expected to increase and thus present road safety conditions in the country could deteriorate further.

1.2 Background

It has been assumed during many years that developing countries had a pattern comparable to the earlier stages of development in industrialized countries. This pattern included that accidents will decline over some time (Mulhrad, 1998). Trend data shows that the number of people killed in road traffic accidents in the developing world continues to increase, whereas in the industrialized countries has been decreasing since the late 1960's (Jacobs et al, 2000).

Motorization promotes the development of the economy of the country, but it also brings about road injuries and a threat to safety. In fact, road injuries in Mauritius have become a public health concern as both the population and motorization increase. Road traffic accidents significantly worsened, rising from 14,371 in 1992 to 18,022 in 202, i.e. from 1369 accidents per 100,000 population to 1535. The number of traffic deaths ranged from 119 to 173 a year over the period, and the number of seriously injured fluctuated from 216 to 378 a year.

The social cost of accidents in Mauritius has been estimated to be just over Rs 1.5 billion in 1999. This was about 1.4% of annual Gross National Product (GNP).

1.3 Purpose and Scope of the Thesis

The primary aim of the thesis is to present the road safety situation in Mauritius based on available statistics from the Central Statistics Office for the year 1992-2002. It therefore aims to examine the magnitude of this multifaceted problem and analyze the causative factors. The questions that are of utmost interest include the following:

1. Where road traffic accidents occur;
2. When road traffic occur;
3. Who are involved;
4. What was the result of the collision;
5. What was the environmental conditions.

The goal is to identify priority target groups, which might be considered in order to shape future interventions strategies to combat this public health epidemic.

The thesis also aims at offering a brief comparison of the road safety situation with other developed and developing countries.

Finally, a research survey has been undertaken to measure current status regarding public's attitudes, knowledge and self-reported behaviours related to road safety and road safety interventions.

1.4 Structure of the Thesis

The thesis is organized as follows:

Following this chapter, **Chapter 2** describes the research methodology undertaken. The research method and instrument used are addressed.

Chapter 3: Presents and discusses the road safety situation in Mauritius for the period 1992-2002. Major provokers of road traffic accidents and solutions to combat this public health problem are discussed.

Chapter 4: It covers the status of road safety interventions in Mauritius. Challenges facing the road safety authorities are also looked into.

Chapter 5: Briefly highlights the survey undertaken. Some problems encountered during the survey are also discussed.

Chapter 6: Is concerned with the analysis and discussions of survey results. Public attitudes to road safety and road safety interventions are critically analysed.

Chapter 7: Provides a conclusion from this study as well as some practical and feasible recommendations.

Chapter 2: Research Methodology

2.1 Research Aims

The present study aims to examine the magnitude of the road safety problem in Mauritius with view to identify priority target groups which might be considered in order to shape future safety interventions. The research also aims to measure current status regarding the public's attitudes, knowledge and self-reported behaviour related to road safety and road safety interventions. Furthermore, data gathered will be used to shape future road safety strategies in order to enhance road safety in Mauritius.

2.2 Research Method

To study the **magnitude of the road safety problems in Mauritius**, data were obtained from reports and statistics released by the Government of Mauritius. The data were, therefore, assumed to be representative of national trends in road traffic crashes, injuries and fatalities. For crashes, injuries and fatalities, the Statistics of the Digest of Road Transport and Road Accident Statistics released by the Central Statistics Office were used. For type of injuries and people treated as in-patients due to motor vehicle traffic accidents, the Annual Health Statistics released by the Ministry of Health and Quality of Life were used. This research is a descriptive analysis of trends in crashes and injuries using time series data.

In investigating about the **"public attitudes to road safety and road safety interventions"**, the survey method was used as it suited the purpose of that study. That method was used as specific and objective information about a large population were needed.

Furthermore, because of time constraints, other qualitative methods such as interviews and other in-depth research methods could not be used for the nearly 250 road users solicited. Therefore, the questionnaire was thought to be an appropriate tool for data collection, though interviews might have provided additional supports. The remaining sections describe the research methodology used in investigating the "public attitudes to road safety and road safety interventions" in Mauritius.

2.3 Research Tool

Questionnaires were found to be most suited in this research and they were sent by mail to the respondents. The mail survey was one of the most common types of research methods used. It was relatively cheap to administer compared to other qualitative methods. Through the mail survey, the same instrument, that is, the questionnaire could be sent to a wide number of people. The respondents could fill-in those questionnaires at their own convenience. However, there were some disadvantages as well. The response rates from those mail surveys could be very low. Furthermore, open-ended questions could not be asked because respondents might find it tiresome to write detailed answers. To have a high response rate, the questionnaire was designed effectively in terms of its content, wording, format and these can have significant impact on the entire study.

In this particular survey, both the structured and unstructured questions were used, though structured questions were mostly asked since it was a mail survey. A few dichotomous questions asking for a "Yes/No" or "Agree/Disagree" response were included. A variety of other ways of laying the questions were equally used. In addition to these, the Likert

response scale asking an opinion question on a scale of 1 to 5 bipolar (as there was a neutral point) was used.

The questionnaire made use of a variety of structured questions with a relatively few unstructured ones. Respondents were given the opportunity and enough space to express their opinion on certain issues.

2.4 Pilot Study

Prior to the final drafting, the questionnaire was administered to a few people from the different ministries in the Government. These people contributed enormously with their critical analysis of the questionnaire in relation to the wordings, understandability and design. Accordingly, some minor changes were made in the questionnaire.

Some positive responses had equally been observed during the pilot study such as:

- Respondents find it more convenient to fill in the structured questions.
- Most of the questions were understandable.

Hence, the questionnaire proved to be an appropriate tool for data collection for this present research undertaken.

2.5 Operationalizing the Questionnaire

The questions have been devised, taking into account the literature review and key issues of road safety.

The questionnaire consisted of questions with point-scale system, closed questions and there were few open-ended questions, inviting the respondents to make suggestions.

A covering letter was attached to the questionnaire. This was employed for the following reasons:

- To introduce the researcher to the respondents. This was done with a view to ensure a higher response rate.
- To inform the respondent of the title of the research.
- To encourage the respondents to fill-in the questionnaires and participate in the study.
- To assure the respondents that confidentiality of the answers would be maintained.
- To show the respondents the objectives of undertaking the survey.
- To make the respondents aware of the deadline for submission of the questionnaires dully filled-in.

At the beginning of the questionnaire, respondents were thanked for allowing the survey to be carried out successfully and at the end, they were thanked for participating in the survey.

The questionnaire was composed of seven sections. A copy of the questionnaire is enclosed at **Appendix 1**.

Section A: Personal Background

This section dealt with the personal characteristics of the respondents such as their education level, their profession and the means of transport they usually use.

Section B: Road Safety in General

This section was concerned with the attitudes of the respondents to road safety in general. It comprised of three structured questions.

Section C: Drink Driving

This section was concerned with the attitudes and knowledge of the respondents to drink driving. It comprised of six structured questions.

Section D: Speeding

This section was concerned with the attitudes of the respondents to speeding. It comprised of four structured questions.

Section E: Restraints

This section dealt with the attitudes and self-reported behaviour of the respondents to the use of seat belts. It comprised of three structured questions.

Section F: Road Safety Campaigns

This section was concerned with the attitudes and knowledge of the respondents to road safety campaigns. It comprised of both structured and unstructured questions.

Section G: Traffic Offences as Per the Road Traffic (Amendment) Act 2003.

This section dealt with the attitudes and knowledge of the respondents to road traffic offences. It comprised of structured questions based on the Likert principles.

At the beginning of each section, the respondents were given instructions how to fill in the questionnaire. The questionnaire consisted of both structured and unstructured format of recording responses to questions. The Likert scale was also used in a few questions whereby the respondents had to choose along a continuum of agreement and disagreement responses.

The questionnaire included both pre-coded and open-ended questions. Pre-coded questions allowed the respondents to code the answers and therefore it was easy to administer the questionnaires and it facilitated data analysis and comparisons of the results of the survey. There was high precision, and less time was required to fill-in the questionnaires compared to open-ended questions.

Chapter 3: The Road Safety Situation in Mauritius

3.1 Introduction

Mauritius is a small island with a land area of 1865 square kilometers. Mauritius was a British Colony until 1968 and became a republic in 1992. The island has a high population density of 624 people per square kilometer.

As in most developing countries, the demand for transport in Mauritius has risen dramatically in recent years. This is due to a number of factors, including the steadily increasing population, an increase in household income for some sectors of the population, migration of the middle class from rural to urban areas. The result of Mauritius' more relaxed approach to travel demand and of high rate of economic growth, is that the number of registered vehicles is currently growing at 4.8% per annum and stood at nearly 260,000 in mid 2002. Mauritius, with 77 cars per thousand people is second only to South Africa in its level of car ownership (International Road Federation, 1995). Traffic and travel demand is rising considerably faster than road space. As a result, the 12% increase in the length of the road network, from 1783 km in 1986 to 2000 km in 2002 is dwarfed by the increase in traffic so that the vehicle density per kilometre increased from 40 to 104 in the 18 years to 1999.

Main roads and 'motorways' account for 50% of the road network, secondary roads 33% and other roads 17%, while the quantity of road infrastructure now meet international standards after three National Highway projects over the last decade.

Despite, or may be because of, the road improvement, the number of road traffic accidents significantly worsened, rising from 14,371 in 1992, to 18,022 in 2002, i.e. from 1369 accidents per 100,000 population to 1535. The number of traffic deaths ranged from 119 to 173 a year over the period, and the number of seriously injured fluctuated from 216 to 378 a year, with both trend remaining stable.

This chapter presents a situation analysis of the burden of road traffic injuries in Mauritius. The goal is also to identify priority groups, which might be considered in order to shape future strategies to reduce the burden of road traffic injuries. Policies and current interventions programs being implemented to combat this public epidemic are discussed in **Chapter 4**.

3.2 Materials and Methods

Information related to road traffic injuries in Mauritius is collected through a standardized form completed by the police officer in charge of traffic control at the site of a crash. The most comprehensive information on traffic crashes, referred to as "traffic accidents", is managed by the Ministry of Public Infrastructure and Land Transport and the Ministry of Health and Quality of Life.

The following definitions were applied on the classification of road traffic injuries by severity.

- **Fatal Injury:** Injuries were recorded as fatal if the victim dies within 7 days as a result of a road accident. (**Note: As from 2002, injuries were recorded as fatal if the victim dies within 30 days as a result of a road accident**).
- **Serious Injury:** Injuries were recorded as serious if the victim was detained as an "in-patient" in a hospital. Any of the following injuries whether or not the victim was detained in a hospital were also recorded as serious injuries:

- Fractures
- Concussions
- Internal injuries
- Severe cuts and lacerations
- Crushings
- Severe general shock requiring medical treatment.

➤ **Slight injury:** An injury of minor character such as:

- Sprain
- Bruise
- Cut not judged to be severe.

The main sources of data used in this study were reports and statistics released by the Government of Mauritius. The data were, therefore, assumed to be representative of national trends in road traffic crashes, injuries and fatalities. For crashes, injuries and fatalities, the Statistics of the Digest of Road Transport and Road Accident Statistics released by the Central Statistics Office were used. For type of injuries and people treated as in-patients due to motor vehicle traffic accidents, the Annual Health Statistics released by the Ministry of Health and Quality of Life were used.

3.3 Results

3.3.1 Trends in Crashes, Fatalities and Injuries, 1992-2002

Table 3.1: Trend of Road Traffic Crashes, Fatalities and Injuries, 1992-2002

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Registered motor vehicles	155,320	168,158	180,884	190,867	200,320	210,922	222,344	233,415	244,018	255,149	265,841
Road traffic crashes	14,371 (100)	14,562 (101)	15,727 (109)	14,683 (102)	14,845 (103)	15,954 (111)	18,055 (126)	17,877 (124)	18,278 (127)	18,517 (129)	18,022 (125)
Crash rate	9.3	8.7	8.7	7.7	7.4	7.6	8.1	7.7	7.5	7.3	6.8
Total number of casualties	4,395 (100)	4,160 (95)	3,947 (90)	3,586 (82)	3,774 (86)	3,755 (85)	3,828 (87)	3,405 (77)	3,291 (75)	3,264 (74)	2,904 (66)
Fatalities	119 (100)	157 (132)	154 (129)	173 (145)	153 (129)	146 (123)	162 (136)	170 (143)	163 (137)	126 (106)	158 (133)
Seriously injured	378 (100)	322 (85)	330 (87)	280 (74)	238 (63)	261 (69)	281 (74)	237 (63)	266 (70)	288 (76)	216 (57)
Slight injuries	3,898 (100)	3,681 (94)	3,463 (89)	3,133 (80)	3,383 (87)	3,348 (86)	3,385 (87)	2,998 (77)	2,862 (73)	2,850 (73)	2,530 (65)
Fatality per 100,000 population	11.3	14.3	14.3	15.9	13.9	13.1	14.4	14.9	14.2	10.8	13.5
Injuries per 100,000 population	418	391	366	330	343	337	340	299	286	280	247

Source: Central Statistics Office.

Note: Figures in Parentheses Indicate Relative Indexing, Assuming 1992=100

Concurrent with the increase in the number of registered vehicles, the number of traffic crashes increased from 14,371 crashes in 1992 to 18,022 in 2002, as shown in **Table 3.1**. The total number of traffic crashes has increased steadily since 1992. However, the crash rate per vehicle has decreased from 9.3% in 1992 to 6.8% in 2002, mainly due to a relatively more rapid increase in the number of registered motor vehicles (71%) than an increase in crashes (25%).

During the same period, the number of fatalities increased by 1.3 times, from 119 deaths in 1992 to 158 deaths in 2002. The number of fatalities showed a consistent increase up to 1995, began to fall, and then stabilized at around 160 deaths per year. However, traffic fatalities per 100,000 population remain rather high at around 14, meaning that 14 people out of 100,000 die from traffic injuries annually.

However, traffic-related injuries are decreasing. These injuries decreased by 1.6 times during the same period, from 4276 (slight and serious injuries) in 1992 to 2746 in 2002. Unlike, the case of fatalities, the number of injuries per 100,000 population is decreasing.

Figure 3.1 shows crashes, fatalities and injuries by index based on 1992 data. It indicates that the number of fatalities is rising at a faster rate than the number of injuries.

The graph of the injury index lies below the crash index, indicating that while fewer are injured, they are dying instead.

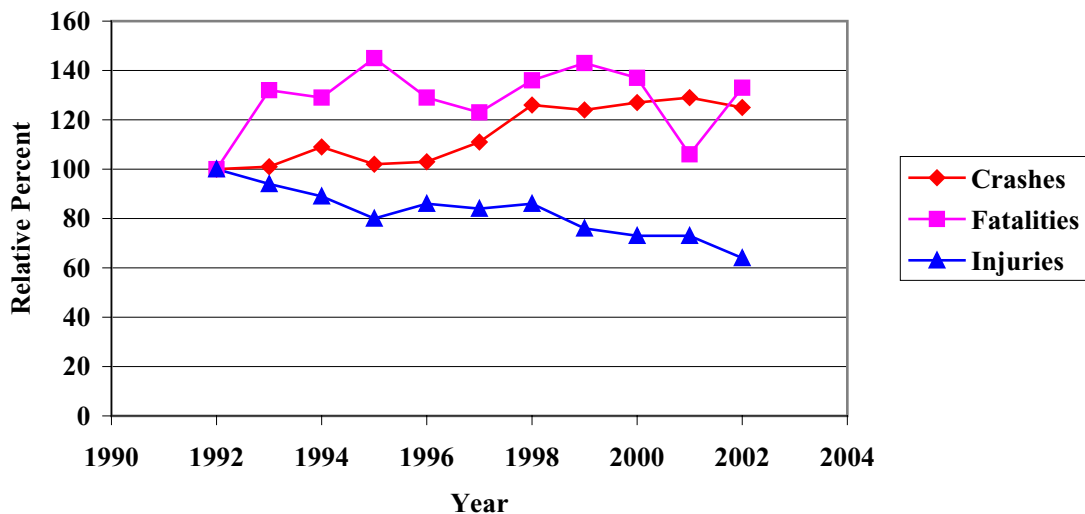


Figure 3.1: Road traffic crashes, fatalities and injuries in Mauritius by index relative to 1992 set at 100%

3.3.2 Geographic Distribution of Road Traffic Injuries

Fatal and injury crashes are primarily a rural phenomenon in Mauritius, as shown in **Table 3.2**. A total of 2420 fatal and injury crashes were reported in 2000, representing 13% of all reported crashes.

Table 3.2: Number and percentage of fatal & injury crashes by location, 2000

Police District	Number of Fatal And Injury Crashes	Percentage Distribution
Port-Louis (South) _ Urban Area	185	7.6
Port-Louis (North) – Urban Area	307	12.7
Pamplemousses/Riviere du Rempart – Rural Area	427	17.6
Moka/Flacq – Rural Area	421	17.4
Grand Port/Savanne – Rural Area	316	13.1
Upper Plains Wilhems – Urban Area	282	11.6
Plaines Wilhems/Black River – Urban/Rural Area	482	20.0
Total	2420	100.0

Source: Central Statistics Office.

Two rural divisions, Pamplemousses/Riviere du Rempart and Moka/Flacq, accounted for nearly 35% of all fatal and injury crashes that occurred during 2000. Grand-Port/Savanne another rural area, accounted for 13.1% of all fatal and injury crashes. Altogether, 58.1% of traffic crashes occurred in the rural areas.

3.3.3 Sex, Age and Road User Category

Male constituted for nearly 78% of the number of casualties in the year 2002. In nearly all age groups, more men are injured than women, but the greatest difference is witnessed among people aged 21-40 years. Men in the age group for the category of driver/rider/cyclist were 43 times more likely to be injured in road accidents than women. The 21-40 population group accounted for 34% of all casualties for the category of pedestrians, 59% of all casualties for the category of passenger and 63% of all casualties for the category of driver/river/cyclists. The results are summarized in **Table 3.3** hereinafter.

Table 3.3: Number of Casualties by age group and sex, year 2002

Age Groups (Years)	Class of Casualty								
	Pedestrian			Passenger			Driver/Rider/Cyclist		
	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes
Under 7	27	25	52	8	22	30	4	2	6
7-12	43	32	75	14	6	20	20	5	25
13-20	47	45	92	53	53	106	107	14	121
21-40	180	72	252	293	162	455	828	19	847
41-50	86	45	131	71	50	121	234	11	245
51-60	51	18	69	8	17	25	103	4	107
Over 60	44	30	74	5	8	13	32	6	38
All ages	478	267	745	452	318	770	1,328	61	1,389

Source: Central Statistics Office.

3.3.4 Type of Vehicle Involved

Mauritius has approximately 7700 vehicles per 100,000 inhabitants. From **Table 3.4**, it can be observed that private cars are mostly involved in road traffic crashes compared to other type of vehicles.

Table 3.4: No. of vehicles involved in accident by type of vehicles, 2000-2002

Type Of Vehicle	Year 2000		Year 2001		Year 2002	
	No. of Vehicles	%	No. of Vehicles	%	No. of Vehicles	%
Private car	15,674	46.7	15,427	45.4	14,852	45.0
Taxi car	2,831	8.4	2,930	8.6	2,921	8.8
Bus	2,244	6.7	2,374	7.0	2,420	7.3
Goods vehicle	8,681	25.8	9,100	26.8	8,987	27.1
Powered two wheelers	3,816	11.4	3,822	11.2	3,656	11.0
Pedal cycle	351	1.0	342	1.0	275	0.8
Total	33,597	100.0	33,995	100.0	33,111	100.0

Source: Central Statistics Office.

3.3.5 Fatal/Serious Accidents and Light Conditions

In general, 41% of the fatal crashes occurred during the hours of darkness. There has been a 30 per cent increase in the number of day times fatal accidents in 2002 compared to 2001 and about 25% increase in the number of night times fatal accidents for the same period of time. The results are summarized in **Table 3.5**.

Table 3.5: Fatal/serious road traffic accidents and light conditions, 2000-2002

Light Conditions	Year		
	2000	2001	2002
Day	205 (84)	210 (65)	200 (85)
Night	134 (64)	120 (47)	106 (59)
Total	339 (148)	330 (112)	306 (144)

Source: Central Statistics Office.

Note: 1. Night conditions refer to the period between sunset and sunrise
2. Value in parentheses indicate fatal accident

3.3.6 Vulnerable Road Users

From **Table 3.6**, it can be observed that pedestrians are the most vulnerable road users in Mauritius. On average, they represented 36% of all crash victims killed between 1992 to 2002, whereas passengers accounted for 20%, drivers 12%, riders 24% and pedal cyclists 8%. Approximately 60% of the total annual road fatalities are pedestrians and riders.

Table 3.6: Number of killed by road user type – 1992-2002

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Pedestrian	49	56	54	64	43	55	62	64	57	48	53	604
Passenger	17	38	32	43	41	25	26	32	35	22	30	339
Driver	13	17	9	15	16	17	19	16	15	22	47	206
Rider	33	31	48	41	40	39	39	46	43	29	16	405
Pedal cyclist	7	15	11	10	13	10	16	12	13	5	12	123
Total	119	157	154	173	153	146	162	170	163	126	158	1677

Source: Central Statistics Office.

3.3.7 Major Causes of Death

Road traffic accidents were ranked eighth among the principal causes of death based on data for the year 2002 compiled by the Health Statistics of the Ministry of Health and Quality of Life. The number one killer in Mauritius is heart diseases. The major causes of death are summarized in **Appendix 2**.

3.3.8 Cases Treated as Inpatients

The nature of injuries due to road traffic crashes are summarized in **Appendix 3** for the year 2000-2002. Intracranial and internal injuries, including nerves were the most common (22%) type of injuries sustained by both male and female as a result of road traffic crashes. Moreover, motor vehicle traffic accidents were ranked third among the cases treated as inpatients.

3.3.9 Nature of Injury

From **Table 3.7**, it can be observed that fracture of skull, neck and trunk were the leading cause of death as a result of road accidents.

Table 3.7: Number of deaths registered by nature of injury and sex, 2000-2002

Ncode	Nature of injury (I.C.D. 1975 revision)	2000			2001			2002		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
124	Fracture of skull, neck and trunk	54	9	63	42	6	48	87	18	105
125	Fracture of upper limb	-	-	-	-	-	-	-	-	-
126	Fracture of lower limb	-	-	-	1	-	1	-	-	-
127	Dislocations, sprains and strains	-	-	-	-	-	-	-	-	-
128	Intracranial & internal injuries, including nerves	44	10	54	48	13	61	36	11	47
129	Open wound and injury to blood vessels	1	-	1	3	1	4	5	1	6
130-135	Other and unspecified injuries	55	8	63	39	6	45	50	6	56
	Total	154	27	181	133	26	159	178	36	214

Source: Health Statistics, Ministry of Health & Quality of Life.

3.4 Comparison with Other Developing and Developed Countries

Road accidents in developing countries are increasing, and the number of those with fatalities and serious injuries is a considerable problem. While the Western Europe and North America have succeeded in checking and even reversing the road accident trend, road accident fatalities in Africa went up by over 350 percent from 1968 to 1990 (Dhliwayo, 1997). Conversely, in the developed countries the number of persons killed declined after 1970. In 1990 road accidents ranked number 12 as a cause of death and number 11 as a cause of life years lost in Sub-Saharan Africa. By 2020, road accidents are expected to be the number 2 cause of lost disability-adjusted life years in developing countries (Murray and Lopez, 1996).

Table 3.8 shows the accident and fatality rates of four African countries together with the same rates of Great Britain. The difference in fatality per vehicle rate among the four African countries and Great Britain is striking. Tanzania's rate is forty-seven times higher than the British rate. However, the rate is lower in the case of Mauritius. Mauritius's rate is only about 6 times higher than the British rate. Compared to the African countries, Mauritius had the lowest fatality rate per vehicle rates.

Table 3.8: No. of road accidents, fatalities and injuries, fatality rates in four African countries and Great Britain, 1995.

	Cote D'Ivoire	Kenya	Tanzania	Mauritius	Great Britain
Road accidents	4,650	12,960	13,767	14,683	230,376
Fatalities	575	2,617	1,663	173	3,621
Injuries	16,700	22,993	12,625	3,413	306,885
Fatalities per 100,000 inhabitants	4.0	10.0	5.6	15.9	6.4
Fatalities per 10,000 motor vehicles	28.8	60.0	66.1	9.0	1.4

The reported data for the overall road safety comparison between Sweden, the United Kingdom (actually the data for Great Britain, without Northern Ireland), the Netherlands and Mauritius are given for year 2000 in **Table 3.9**.

Table 3.9: No. of fatalities and injuries, fatality rates in three developed countries and Mauritius, 2000.

	Sweden	UK (GB)	Netherlands	Mauritius
Fatalities	591	3,409	1,082	163
Severely injured	4,103	38,155	1,507	266
Slightly injured	18,520	278,719	34,577	2,862
Fatalities per 100,000 population	6.65	5.87	6.82	14.2
Fatalities per 10,000 vehicles	1.21	1.19	1.28	7.0

The rates do not seem to differ much between the three developed countries. Compared to the three developed countries, Mauritius has a poor road safety record with higher fatality rates.

3.5 Discussion

This review highlights the lack of surveillance system with accurate and reliable data on which road safety policy and interventions might be based. Data from the various organizations are incomplete and published research papers are also scanty. Nevertheless, the available data provide some information that characterizes the magnitude and consequences of road traffic crashes in Mauritius. The enormous increase in crashes and the resulting injuries and death experienced over the last decade is illustrative of the worsening road safety situation in the country. In fact, injuries from motor vehicle crashes are responsible for nearly 160 deaths and approximately 3500 persons suffer from non-fatal injuries per year. The number of road traffic accidents has increased significantly from 14,371 in 1992 to 18,022 in 2002. Road traffic injuries in Mauritius involve mainly pedestrians. Hence more focus should be geared towards empowering the pedestrians.

Chapter 4: Status of Road Safety Interventions

4.1 Development of Road Safety Measure

Up to the late 1990's, road safety work was given a low profile in Mauritius, and there was no programmed, coordinated and countrywide road traffic injury prevention system.

A national road safety improvement programme was initiated in 2000 when the government of Mauritius established the National Road Safety Council and the Road Safety Unit at the Ministry of Land Transport. The road safety strategy of the National Road Safety Council is to reduce road deaths and injuries (KSI) by one-third by the year 2010 compared to the average figure of 1996-2000. This target will be achieved with a combination of measures involving the three E's of road safety: **Engineering, Education and Enforcement**. Two Action Plans have been devised and are being systematically followed. The Action Plans focused on 8 priority actions: **1. action on drink driving, 2. speed management, 3. safer motorcycling, 4. increased enforcement effort, 5. improved accident data and analysis, 6. engineering improvements on existing roads, 7. road safety audits for new road schemes, 8. improving children's road safety skills.**

4.2 The National Road Safety Council of Mauritius

The National Road Safety Council was established in the early 1990's through an amendment of the Road Traffic Act to set national policy on road safety, develop relevant implementation strategies, coordinate the work of all organizations involved in the promotion of road safety, and formulate a long-term programme for effective road safety work in the country. As shown in **Table 4.1**, its membership is multisectoral and comprises representatives of seven government ministries, organizations and institutions involved in road safety work.

Table 4.1: Membership of National Road Safety Council

-
- Ministry of Public Infrastructure, Land Transport and Shipping
 - Ministry of Health
 - Ministry of Education
 - Association of Insurance
 - Association of Bus Owners
 - Traffic Management and Road Safety Unit
 - Non Governmental Organisation
-

4.3 Legislation to Promote Road Safety in Mauritius

The Road Traffic Act has recently been amended with a view to providing for more severe penalties for traffic and road safety related offences. Amendments have been made in the Road Traffic Act to group and update all the safety-related provisions as well as to tightening the law regarding traffic offences. The previous provisions were inadequate to act as a deterrent or to enable the proper control and regulations of traffic along roads in Mauritius.

The main sections which have been amended are as follows:

- Lowering the permissible alcohol level in the blood for motorists from 80 to 50 mg of alcohol in 100 ml of blood.
- Introduction of breath test using modern roadside as well as evidential breathalyzers.
- Provision of tougher fines coupled with imprisonment for drink driving offences.
- Drivers and Pillion Riders of motorcycles and autocycles should wear securely protective helmets. The number of persons on a motorcycle as well as on an autocycle is now restricted to only two.
- Seat belts are now mandatory to be used in the rear seat of a vehicle.
- Careless and inconsiderate cycling as well as cycling under the influence of intoxicating drinks are now sanctioned by law.
- Drivers shall not use hand-held microphone or telephone handset whilst driving.
- Making way for the introduction of the Penalty Points System.

4.4 Road Safety Intervention – Engineering Approach

The National Road Safety Strategy has one of its component the review of existing speed limits on roads in Mauritius, to make necessary changes and improve the signing of speed limits. The main objectives of this review were to achieve a speed limit, which is reasonable, apparent, credible and acceptable to the drivers and other road users in general. Other road safety engineering interventions included:

- Construction of road humps at accident-prone areas and along built-up areas.
- Improvement of road signing (both vertical and horizontal) along the busiest road over the island.
- Improvement of accident black spot areas.
- Provision of footpath in built-up areas to segregate foot traffic from vehicular traffic.
- Provision of pedestrian footbridges and underpasses along the motorways to ensure safe crossing.

4.5 Road Safety Interventions – Education Approach

To change the attitudes and behaviour of the road users a series of ETP (Education, Training and Publicity) programs have been initiated by the Ministry of Land Transport in close collaboration of the Police. The main achievements so far included:

- Creation of a mobile traffic playground, which goes to every primary school over the island. The overall aim is to instill responsible attitudes in school children to road safety.
- Organising at least one hard-hitting road safety publicity campaign every year.

4.6 Road Safety Interventions – Enforcement Approach

4.6.1 Speeding/Inappropriate Speed

Speeding and inappropriate speed are considered to contribute to a very much higher percentage of all accidents. Moreover, international research suggests that up to a third of all fatal road traffic accidents are speed-related (Finch et al, 1998). Speed limit offences processed by the Police continue to rise. Speed limit offences carried out for the period 2000-2003 are shown in **Table 4.2**.

Table 4.2: No. of offences For Speeding above posted speed limit

Year	No. of offences
2000	12,941
2001	21,885
2002	30,155
2003	39,442

Source: Police Road Safety Unit

4.6.2 Drink Driving

Drink driving, sometimes referred to as ‘drinking under the influence’ (DUI) or ‘driving while impaired’ (DWI) is considered to be one of the most dangerous and anti-social behaviours linked to alcohol consumption. This is because it has long been recognized as one of the leading causes of road traffic injuries and fatalities in high income countries. Roadside breathalyzer tests carried out by the police for the period 2000-2003 are shown in **Table 4.3** hereinafter.

Table 4.3 Drink-driving offences

Year	No. of Interventions	Positive Test	Negative Test
2000	1086	741	345
2001	2030	1712	318
2002	2020	1528	492
2003	2470	1321	1149
Total	7606	5302	2304

Source: Police Road Safety Unit

4.7 Strength and Weaknesses in Road Safety

4.7.1 Strengths

- The legislation needed for road safety work exists in Mauritius. Moreover, the Road Traffic Act has recently been amended with a view to providing for more severe penalties for road safety related offenses.
- Most people responsible for road safety in Mauritius have a basic knowledge of this multifaceted problem. These people, though not holding high academic qualifications in the field of road safety are aware of the scope of the problem and are also committed to reduce the number of killed and seriously injured on roads in Mauritius.
- Measures to combat the problem of road safety exist, such as accident data recording systems, road safety engineering, publicity campaigns, driver training, enforcement, vehicle inspection and emergency medical services.

4.7.2 Weaknesses

- The main problem seems to be the lack of political concern and priority. The low priority may be due to a lack of understanding of the scope and severity of the road accident problem.
- Despite having an accident recording system, dissemination of road accident statistics are low and poor. Detailed information on accident costs, cost-benefit analysis of accident countermeasures do not exist.
- Lack of funds also hinder works to combat the road accident problem. In Mauritius, the Ministry of Finance sets the limits of funds dedicated to road safety, but is not in touch with the extent of the road accident problem.

4.8 Discussions

Since 1999, the Government of Mauritius has made an effort to address the problem of road safety at a national level. The Ministry of Public Infrastructure and Land Transport has set up a Road Safety Unit and a National Road Safety Council. An annual budget of Rs 20 million is dedicated to road safety in Mauritius.

Despite all these efforts, road traffic injuries still pose a major threat to the well-being of the nation. There is still a high rate of road injuries and fatalities. This signals the necessity for further efforts to reduce the rates.

The best solution in tackling the problem of road safety in Mauritius is to involve a combination of road safety engineering, education, publicity and information and, sustained enforcement by the police.

Chapter 5: The Research Survey

5.1 General

A questionnaire survey was conducted by sending out a 5-page questionnaire to 250 people working in both the public and private sector in Mauritius. The sample size also included students at the University of Mauritius and secondary schools.

5.2 Administering and Distributing the Questionnaire

Before distributing the questionnaires, the respondents were contacted individually by phone in order to explain to them the aims and objectives behind this survey work. The questionnaires were then handed out individually. This was done with a view to ensuring a higher response rate in comparison to that of mailing or even e-mailing. Respondents were asked to return the questionnaire within one-week time.

5.3 Collecting the Questionnaire

Once again, the questionnaires were collected individually. However, a few of the respondents had partly filled in the questionnaire because of lack of time. Consequently they were encouraged to fill them as they were given one more week. The response rate was surprisingly quite high. This may be due to the fact that the subject matter dealt was of interest to them. The survey fieldwork was conducted satisfactorily. Many of them had even expressed their wish to have a feedback on the research findings.

5.4 Response Rate

The response rate determines to a large extent the success or failure of a data collection process. A high response rate therefore shows that many respondents had participated in the survey.

Out of the 250 questionnaires which were individually sent to the respondents, 225 were returned. However, only a few were returned unanswered or partially answered by the respondents. Nevertheless, 219 questionnaires, which represented a return rate of 88%, were received duly filled and suitable for analysis. This was well above expectations. The research survey showed the keen interests of the respondents to fill in the questionnaires. Quite a high number of them have demonstrated their interest in the subject matter.

5.5 Representing the Data

Representing the data is an art. In fact, the data collected have to be presented in a way intelligible to a third party. In this research, tabular and graphical presentations were done for some of the questions in order to better illustrate the findings of the survey.

5.6 Problems Encountered During the Survey

Some of the problems encountered during the survey were:

- Some of the respondents partly filled in the questionnaire.

- About ten of the respondents lost their questionnaires and were, therefore, given other questionnaires. They took some time to reply back.
- Several attempts were made to distribute and collect the questionnaires individually. A few of the respondents could not be reached particularly in the private sector since the professionals were always on the move. Nevertheless most of them co-operated satisfactorily.

Chapter 6: Analysis and Discussions of Survey Results

6.1 Data Analysis

Following data collection process, analysis of the survey has been undertaken. The respondents to the questionnaire have also been invited to add their comments wherever necessary. These comments have been carefully examined and included in the findings of the survey in order to support the strength of the responses.

6.2 Personal Background of Respondents

Section A of the questionnaire concerned the personal background of the respondents. 219 out of the 250 road users responded to the survey. The respondents consisted of secondary school teachers, university students, engineers, nursing of officers, scientists, secondary school teachers, it professionals, administrators and policeman. Most of the respondents (70%) were holder of a degree and a master degree in their respective field. A few (10%) respondents were holders of a PhD and the others (20%) were holders of either a diploma or higher school certificate. Most of the respondents (90%) were in the age-group 25-44 years.

Male were mostly represented in the sample, with a percentage of 62% compared to 38% for woman. 98% of the men were holders of a valid driving license, while only 33% of the women were holders of a valid driving license.

6.3 Findings of the Survey

Sections B-G of the survey questionnaire was designed with a view to knowing the attitudes, knowledge and self-reported behaviour of the road users related to road safety and road safety interventions in Mauritius.

Question 1: How Safe Are the Roads in Mauritius?

Out of the 219 respondents, 72% said that road travel in Mauritius as "fairly safe". A further 12% described it as "safe", while 16% stated it as "not safe at all". **Table 6.1** lists the results of the responses.

Table 6.1: Attitudes to the level of safety on roads in Mauritius

	Male (Out of a total of 135)		Female (Out of a total of 84)	
	No.	%	No.	%
Very safe	0	0%	0	0%
Safe	18	13%	9	11%
Fairly safe	101	75%	57	68%
Not safe at all	17	12%	18	21%

Given the fact that a high percentage of respondents (88%) described that roads in Mauritius are not safe, sustained efforts from the Government geared towards the 3 E's of road safety are vital in order to increase the level of safety on roads in Mauritius.

Question 2: Factors Leading to Road Accidents.

In this particular question, the respondents were required to answer several questions to find the most probable cause of road accidents in Mauritius. From **Table 6.2** as shown hereinafter, excessive speed and drink driving are widely acknowledged as major contributing factors to road accidents and were mentioned as such by 91% and 89% of the Mauritians respectively. Lack of driver training was also mentioned by a high percentage of respondents (70%) as a factor leading to road crashes. Engineering factors, namely poor road design and poor road lighting were also widely acknowledged as major factors leading to road accidents causation and were stated by 60% and 63% of the respondents. One of the environmental factors, namely bad weather was perceived to be a relatively low contributing factor to road accidents and was mentioned as such by only 45% of the Mauritians. The results are summarized in **Table 6.2** hereinafter.

Table 6.2: Factors leading to road accidents in Mauritius

Factors	% who "agree" or "strongly agree"	% who are "neutral"	% who "strongly disagree" or "disagree"
Lack of driver training	70	24	6
Driver fatigue	56	29	15
Poor road signs	50	27	23
Excessive speed	91	4	5
Drink driving	89	6	5
Lack of police enforcement	58	22	20
Bad weather	45	37	18
Poor rod design	60	24	16
Poor road lighting	63	22	15

Question 3: Introduction of the Penalty Point System as a Measure to Reduce Road Death in Mauritius.

57% of the respondents said that the introduction of the Penalty Point System can help to reduce the road toll in Mauritius. The results are shown in Table 6.3.

Table 6.3: Attitudes to the introduction of penalty point system in Mauritius

	No. of Responses	% of Responses
Yes	124	57%
No	58	26%
Don't Know	37	17%
Total	219	100%

26% of the respondents thought that the introduction of the Penalty Point System will not help to reduce the number of fatalities in Mauritius. It is worthwhile to point out that the Ministry responsible for road safety in Mauritius is making way for the introduction of the Penalty Point System.

Question 4: Knowledge of the Term Blood Alcohol Concentration.

Out of the 219 respondents, 78% knew about the term while 18% stated that they had never heard of it. 21% of the respondents who did not know the term in both male and female were holder's of a valid driving license. Table 6.4 and 6.5 list the results of the responses.

Table 6.4: Knowledge of the term blood alcohol concentration in general

	No. of Responses	% of Responses
Yes	171	78
No	40	18
Don't Know	8	4
Total	219	100

Table 6.5: Knowledge of the term BAC by category

	Male (Out of a total of 122 holders of a valid driving license)		Female (Out of a total of 28 holders of a valid driving license)	
	No.	%	No.	%
Yes	98	80	22	79
No	24	20	6	21

Given the fact that 22% of the respondent’s have not heard of the term Blood Alcohol Concentration, education and promotion by the road safety institutions, publication of leaflets are vital to educate drivers on this issue.

Question 5: Lowering of the Blood Alcohol Concentration to Zero.

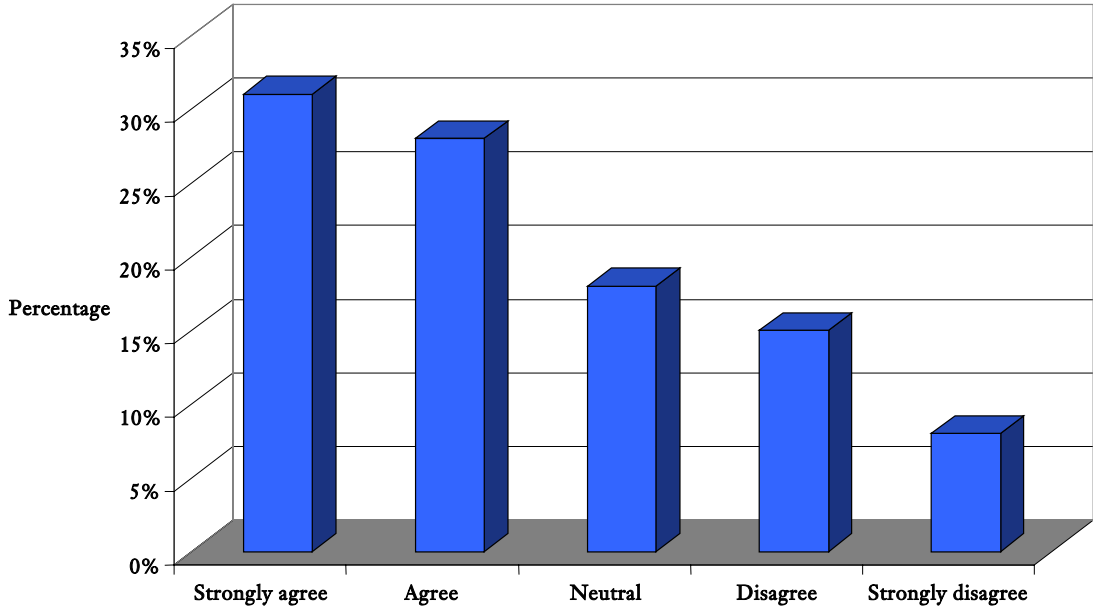


Figure 6.1: Attitudes to Lower the BAC to Zero

A large proportion of the respondents, 59% are supportive that people should not be allowed to drive if they have had any alcohol at all. Only a small percentage (23%) is against this proposal. From data gathered from the Police Road Safety Unit, it can be deduced that drink driving is still a problem in Mauritius and needs to be addressed more seriously, despite the fact that the permissible alcohol level in the blood for motorists has been lowered from 80 to 50 mg.

Questions 6 & 7: Chance of Being Breath-Tested for Drink Driving.

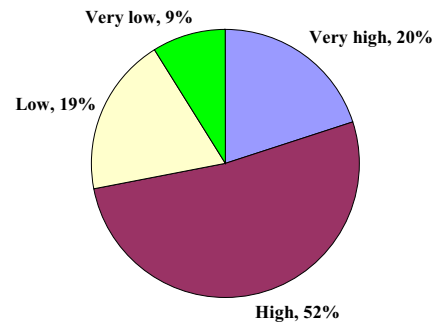
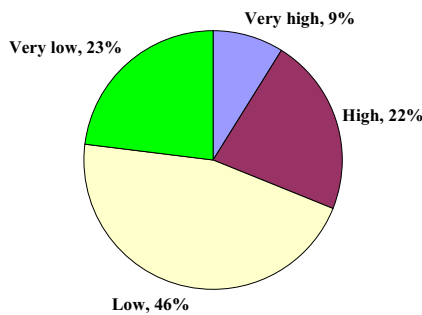


Figure 6.2: Chance of being breath-tested in villages Figure 6.3: Chance of being breath-tested in towns

The chance of being breath-tested if drink driving in villages and towns are shown in Figures 6.2 and 6.3. The risk of being caught driving after drinking is more pronounced in towns than in villages. This is supported by the results as 69% of the respondents said that the risk of being breath-tested in villages is low while 72% believed that the risk of being caught drink driving in town is high. More efforts should be made on the part of the Police to intervene on an island wide basis rather than focusing on distinct areas over the island.

Question 8: Opinion on Automatic Loss of Licence for Drink Driving Above the Legal Limit.

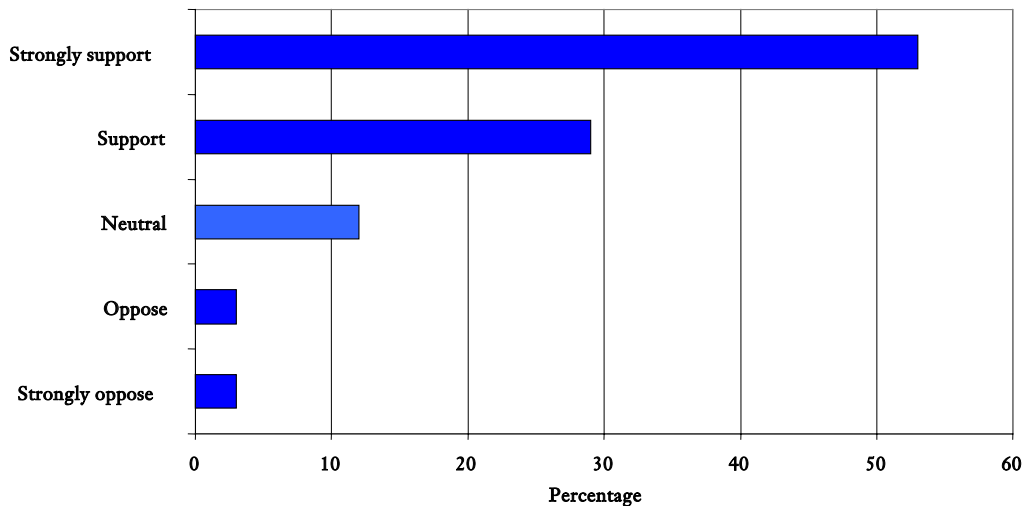


Figure 6.4: Attitudes on automatic loss of licence

From **Figure 6.4**, the majority of the respondents (82%) are agreeable for automatic loss of license for a short period of time (e.g. 1 month) for anyone caught driving with a blood alcohol concentration twice that of the legal limit of 50 milligrams.

Question 9: Strategies to Reduce or Prevent Drink Driving in Mauritius.

Table 6.6: Attitudes on strategies to reduce/prevent drink driving

Strategies	% who “strongly agree” or “agree”	% who are “neutral”	% who “strongly disagree” of “disagree”
Increasing the costs of alcoholic drink	43	18	39
Providing people who have had too much to drink an alternate way of getting home other than driving themselves	76	12	12
Raise public awareness about the dangers of drink driving	93	4	3
Increasing police efforts to contravene drunken driving	89	8	3
Making it more difficult to get alcohol at certain times or days of the week	60	18	22

The respondents believed that the two most effective strategies to reduce or prevent drink driving s to raise public awareness about the dangers of drink driving (93% very effective) and increasing police efforts to contravene drunken driving (89% effective). Increasing cost of alcoholic drinks (43%) and making it more difficult to get alcohol at certain times or days of the week (60%) are perceived to be less effective measures. Providing alternative means of transportation (to self driving) for impaired drivers (76% effective) could also be an effective strategy to reduce impaired driving.

Question 10: Lowering of Speed Limit in Residential Areas.

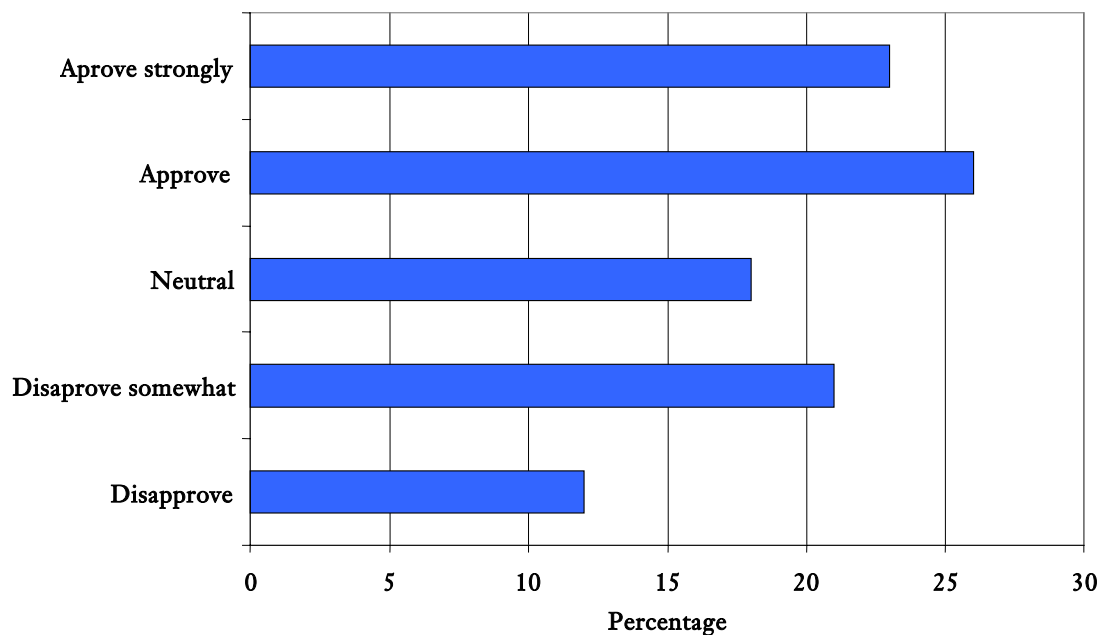


Figure 6.5: Perception on lowering the speed limit in residential areas

49% of the respondents are agreeable that the existing speed limit of 50 km/h in residential areas be lowered to 40 km/h, while 33% are against this proposal. A reduction in the speed limit in built-up areas may help to reduce the accident occurrence and severity of crashes. But any speed limit review should always strike the right balance between traffic fluidity and road safety.

Question 11: Use of Speed Cameras as a Deterrent to Fast Driving.

Table 6.7: Attitudes on the Use of speed cameras

	No. of Responses	% of Responses
Yes	178	81%
No	25	11%
Don't Know	16	8%
Total	219	100

From **Table 6.7**, it can be observed that the majority of respondents (81%) believed that the use of speed cameras in Mauritius can act as a deterrent to fast driving. Given the fact that it is believed that excessive speed is a major contributing factor in accident causation in Mauritius, the use of speed cameras may be the solution.

Question 12: Use of Speed Cameras.

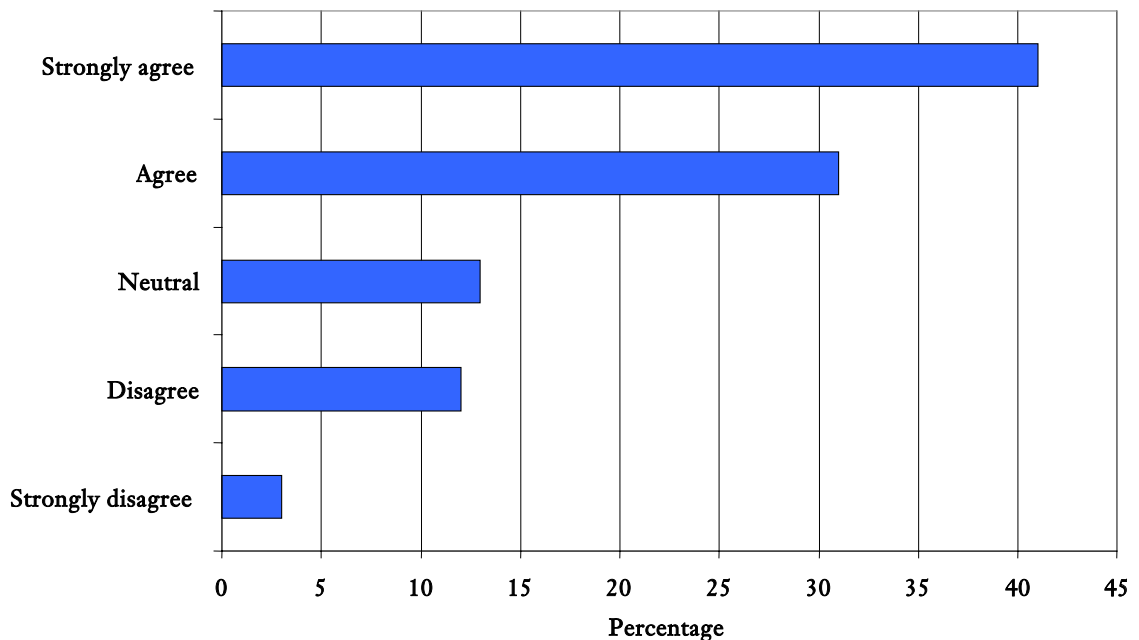


Figure 6.6: Attitudes of automatic loss of licence for speeding at 100km/h in a 50 km zone

From the Figure above, a high majority of respondents (72%) are agreeable for automatic loss of licence for drivers caught driving at 100 km/h in a 50 km zone (e.g. in residential areas). Very few of the respondents (15%) are against this proposal. It is worthwhile to point out that following a speed review exercise, the authorities in Mauritius are in favour to relax the speed limit in residential areas from 50 to 40 km/h. But this should be followed by sustained police intervention in order to deter fast driving. To date no provisions have been made in the Road Traffic Act for automatic loss of driving licence for a short period of time for speeding offences.

Question 13: Attitudes on Various Measures about Road Safety.

In this particular question, the respondents were required to answer several questions which have a direct impact to enhance road safety in Mauritius, if implemented.

Table 6.8: Attitudes on various measures to enhance road safety in Mauritius

Statements	Male				Female			
	Agree		Disagree		Agree		Disagree	
	No.	%	No.	%	No.	%	No.	%
Fines for speeding are mainly intended to raise revenue for the Government	61	45%	74	55%	42	50%	42	50%
Speed limit are generally set at a reasonable limit on main roads in Mauritius.	91	67%	44	33%	62	74%	22	26%
Rapid increase in fines would decrease the number of crashes on our roads	65	48%	70	52%	51	61%	33	39%
People riding bicycles should wear helmets as it is the case for motorcycles and autocycles	75	56%	64	44%	61	70%	23	27%
The authority should work in close collaboration with the NGO and Civil Society in order to adopt a community approach to tackle the road safety problem in Mauritius	127	94%	8	6%	79	94%	5	6%
The authority should stop to construct road humps along main roads as these are very uncomfortable to passengers and emergency vehicles despite being very effective in speed reduction	90	67%	45	33%	52	62%	32	38%
Road safety should be regarded as a Public Health Issue and not just left as a transport and traffic problem	125	93%	10	7%	80	95%	4	5%
Road safety education should be introduced in school curriculum in Mauritius.	127	94%	8	6%	80	95%	4	5%

From **Table 6.8**, the following issues may help to control the problem of road safety in Mauritius if duly implemented and accepted by all responsible parties. They were acknowledged by 94%, 95 % and 62% of the respondents accordingly.

- The authority should work in close collaboration with the NGO and Civil Society in order to adopt a community approach to tackle the road safety problem in Mauritius.
- Road Safety should be regarded as a Public Health Issue and not just left as a transport and traffic problem.
- Road Safety Education should be introduced in school curriculum in Mauritius.
- People riding bicycles should wear helmets as it is the case for motorcycles and autocycles.

Question 14: Use of Seat Belts in the Front Seat.

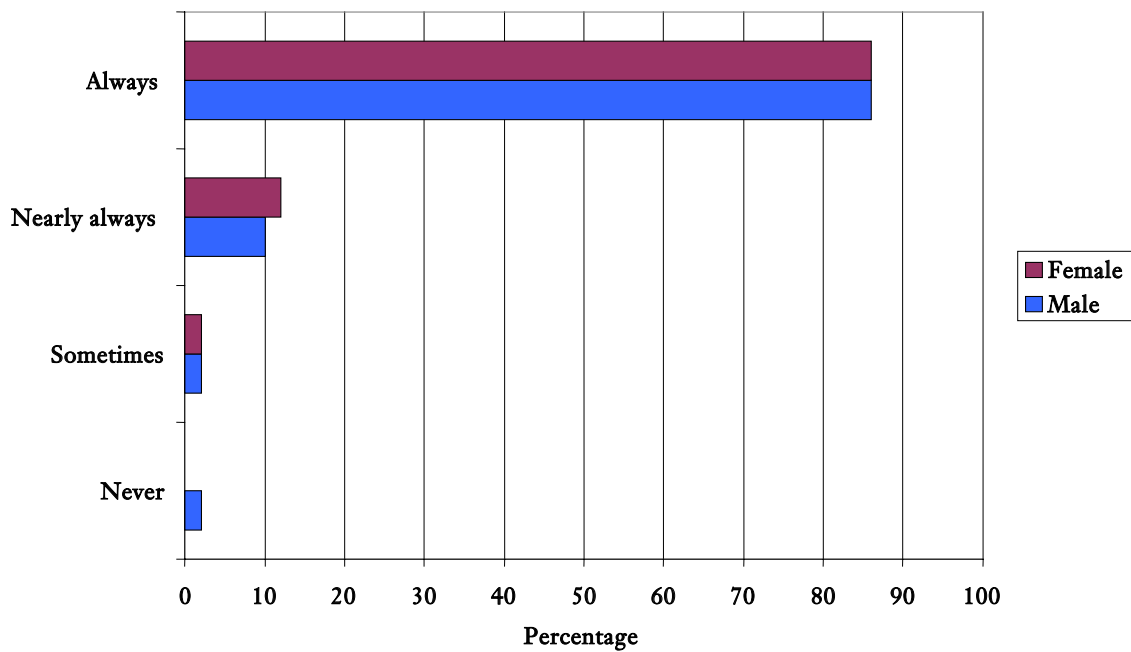


Figure 6.7: Frequency of using seat belts in the front seat

Most of the drivers or people (97%) in the front seat always use seat belts, while only a few (3%) sometimes or never wear any seat belts. Seat belts are in fact provided as a safety device in vehicles and all people should be encouraged to use them for their own safety. From the results obtained, it can be deduced that front seat passengers and drivers (both males and females) are well aware of the risk of not using seat belts.

Question 15: Use of Seat Belts in the Rear Seat.

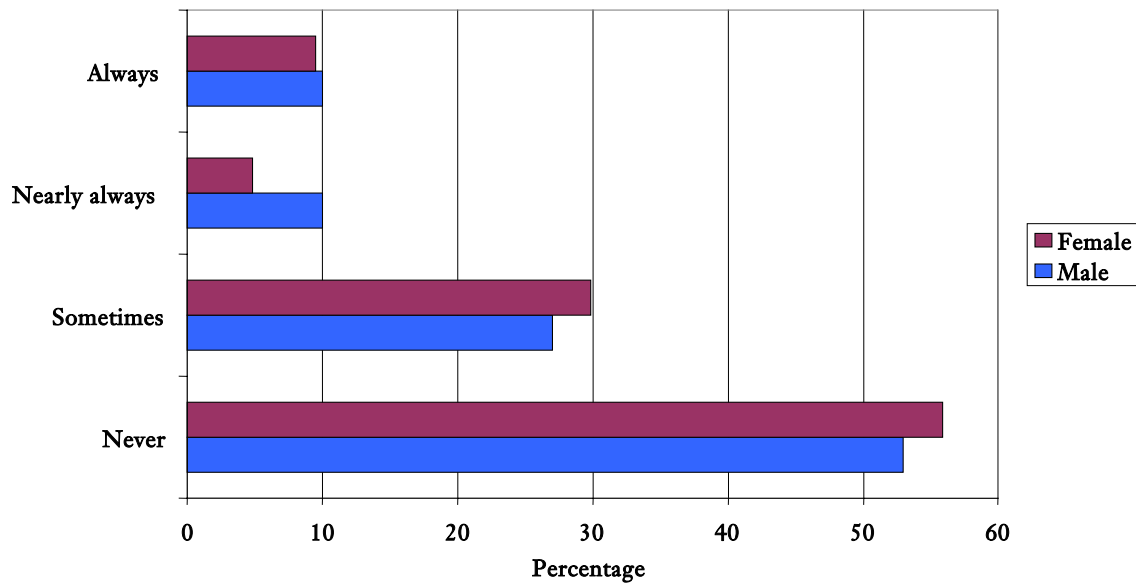


Figure 6.8: Use of seat belts in the rear Seat

Reported rear safety belt use is very low compared to front seat. 82% of the respondents said that they sometimes or never use seat belts when traveling in the rear seat. Only 10% of the respondents use seat belts when traveling at the rear seat. These results show that there is still a high number of people who are still not aware of the risk associated with the non-wearing of rear seat belts in case of a crash. It is quite surprising to note that a large number of people are not using rear seat belts despite the fact that the law has been amended since September 2002 whereby non-use of rear seat belts in motor vehicles is an offence.

Question 16: Risk of Being Caught for not Sing a Seat Belt.

Table 6.9: Risk of being caught for non-wearing of seat belts

	Very high	High	Low	Very low
Driving	46%	34%	15%	5%
Front seat	35%	43%	18%	4%
Rear seat	5%	6%	35%	54%

From **Table 6.9**, it can be observed that the risk of being caught by the police for non-wearing of seat belt as a front seat passenger or as a driver is very high as acknowledged by 80% of the respondents. People not wearing a rear seat belt is less likely to be caught by the police as acknowledged by 89% of the respondents. For the safety of all users of motor vehicles, it is highly recommended that seat belts should always be used and in the same line hard hitting campaigns focused on the risk of non-use of seat belts should be regularly organized.

Question 17: Recent Campaign Organized by Organizations Responsible for Road Safety.

Table 6.10: Knowledge on recent campaign focused on road safety

	Male		Female	
	No. of responses	%	No. of responses	%
Correct	29	21%	18	21%
Incorrect	106	79%	6	79%
Total	135	100%	84	100%

On 7 April 2004, the Traffic Management and Road Safety Unit in collaboration with the police organized a campaign against the use of mobile phones while driving. This campaign was launched to celebrate the World Health Day which was dedicated to road safety. Surprisingly a high percentage of respondents (79%) both male and female were not able to correctly identify the campaign against the use of mobile phone while driving.

Question 18: Do You Think that the Ministry Should Continue to Organize Campaigns.

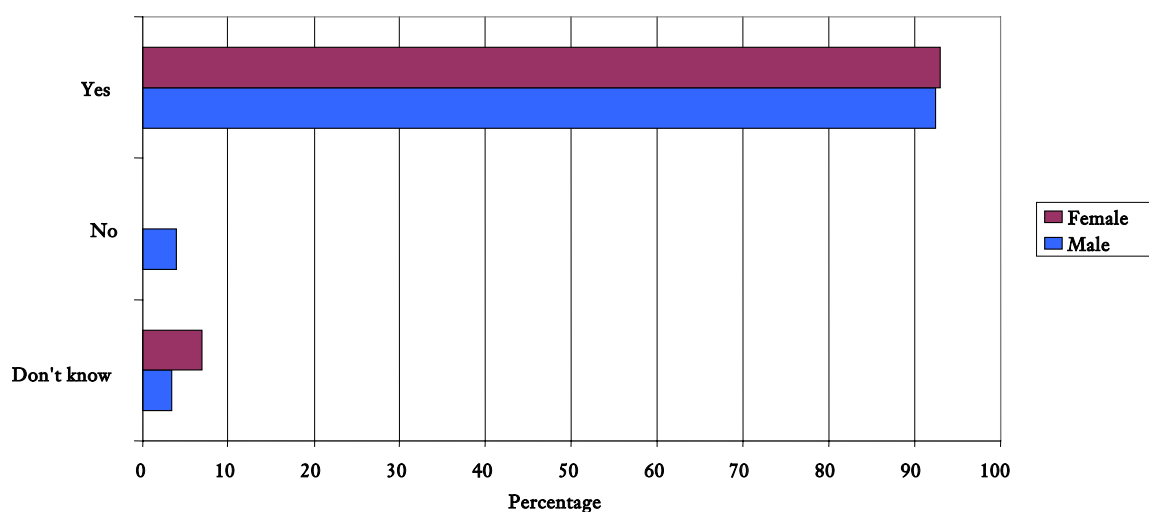


Figure 6.9: % of Responses for organization of road safety campaigns

Most of the respondents (93%) said that the Ministry should continue to organize road safety campaigns. Only a very few respondents (2%) are against this proposal. In fact, the Ministry organizes campaign on road safety every year in order to make people more aware of the risk and consequences with regards to road safety. But the only obstacle to organize long lasting campaigns is associated with financial constraints.

Question 19: Use of Shocking Images in Road Safety Campaigns.

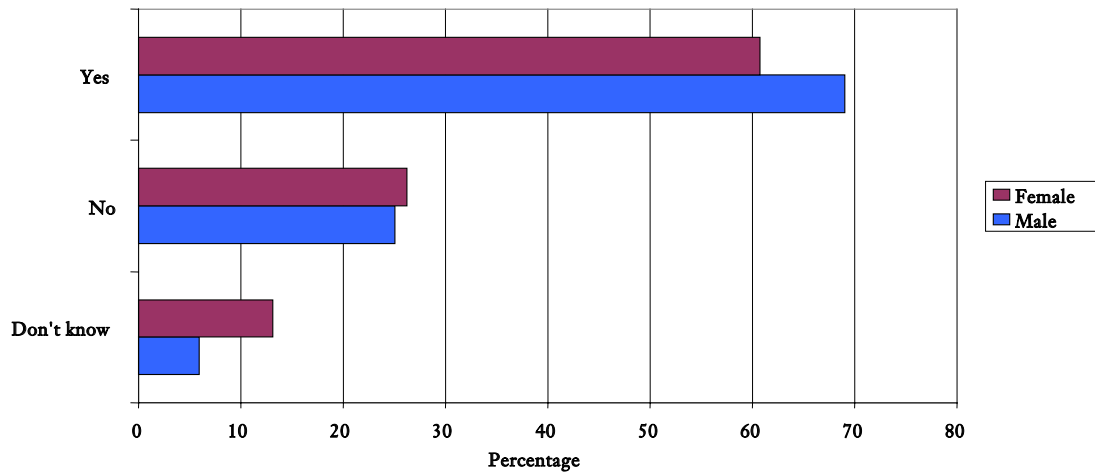


Figure 6.10: Attitudes to the use of shocking images in road safety campaigns

The use of shocking images in road safety campaigns has been acknowledged by only 66% of the respondents and 26% are against this proposal. It is believed that scaring tactics do not always result in successful results in road safety campaigns. The results are shown in Figure 6.10 above.

Question 20: Opinion on Penalties as Per Road Traffic Act 2003.

Table 6.11: Opinion on penalties as per road traffic act (Amendment) 2003

Factors	% "somewhat appropriate" or "very appropriate"	% who are "neutral"	% "not at all appropriate" or "not very appropriate"
Drivers caught using mobile phones while driving are liable to a fine not exceeding Rs 3,000	81%	7%	12%
Non-wearing of seat belts lead to a fine not exceeding Rs 1,000	72%	14%	14%
Killing a person due to dangerous driving (e.g. speeding): Fine is between Rs 25,000 to Rs 50,000 + imprisonment for a term not exceeding 3 years	75%	9%	16%

The recent amendments brought to the Road Traffic Act to providing more severe penalties for road safety offences are highly welcomed by most of the respondents. In fact 72-81% found the three different scenarios as very appropriate and somewhat appropriate. Only a few of the respondents (12-16%) found the new laws as not very appropriate and not at all appropriate. The results are summarized in Table 6.11 above.

Question 21: Opinion on Penalties as Per Road Traffic Act 2003 for Drink Driving.

Table 6.12: Opinion on penalties as per road traffic act (Amendment) 2003 for drink driving

Factors	% “somewhat appropriate” or “very appropriate”	% who are “neutral”	% “not at all appropriate” or “not very appropriate”
First offence: fine between Rs 10,000 to Rs 25,000 + imprisonment not exceeding 6 months.	73%	8%	19%
Second offence: Fine between Rs 20,000 to Rs 50,000 + imprisonment between 6 months to 1 year	74%	13%	13%
Causing death: Fine between Rs 25,000 to Rs 50,000 + imprisonment not exceeding 3 years	70%	13%	17%

The recent amendments brought to the Road Traffic Act to providing more severe penalties for road safety offences for drink driving are approved by most of the respondents. In fact 70-74% found the three different scenarios as very appropriate and somewhat appropriate. Only a few of the respondents (13-19%) found the new laws as not very appropriate and not at all appropriate. The results are summarized in Table 6.12 above.

Question 22: Suggestions to Improve Road Safety in Mauritius.

Representative answers given by the respondents to the above question were as follows:

- Tougher driving test.
- Proper lighting at specific places e.g dangerous curves.
- Medical clearance should be issued prior to issue of driving license.
- Introduction of “Moto Cycle” in Mauritius, given the fact that two-wheelers are one of the most vulnerable road users in Mauritius.
- Everybody who are directly involved in road safety campaigns should follow a course in psychology. This will help to design slogans which will have more positive impact on the targeted population.
- Bicycle riders should wear helmets.
- Devise schemes to reward good drivers.
- To review the method of issuing driving license.

Chapter 7: Conclusion and Recommendations

7.1 Conclusion

Each year, about 160 people are killed in Mauritius due to road traffic injuries and approximately 3000 persons suffer non-fatal injuries. The number of road traffic accidents has increased by 25% and fatalities by 34% since 1992.

Road traffic fatalities and injuries in Mauritius rose hand in hand with rapid motorization. Motor vehicle ownership increased by 71% between 1992 and 2002, spurred by the rapid economic growth of the country. Part of the road safety problem is due to the fact that road infrastructure expansion has been out of phase with demand for road space. While the number of vehicles rose by 71% between 1992-2002, the road space was expanded by only 5%, thus increasing crash risk.

Causes of road traffic injuries are multifunctional and interrelated. This implies that data on causality need to go beyond just listing causes such as vehicle, road environment or human error, to determine underlying, multifunctional causes through purposely designed epidemiological studies.

From statistical analysis of available data, it can be observed that pedestrians are over-represented in fatal accidents in Mauritius. Since the past five years (1997-2001) pedestrians accounted for more than one third of the total killed (286 out of 767) on the roads. In fact, 1 in 3 killed on roads in Mauritius is a pedestrian. Hence, ensuring protection for this vulnerable group will require changes in the road infrastructure, enforcement of vehicle speed limits and improved access to medical emergency care for the victims. Policies and programs need to be well resourced and evaluated for impact, and key stakeholders, including the public, need to be involved in the design and implementation of road safety policies and programs.

Mauritius is making huge strides at national level in designing and implementing policies and programs for injury prevention and control. However, a number of challenges in current road safety programs remain. They include: lack of programs and resources for measuring the impact of individual road safety policies and programs; inadequate law enforcement; incoherent prevention programs; inadequate road safety audit; road construction that does not take into account land use, road safety and the interaction of different road users such as pedestrians and poor resources for road safety.

Although road traffic injuries are a major public health problem in Mauritius, they have not been accorded the level of importance they deserve. So, as in other developing countries, road traffic crashes remain largely neglected by those who set the country's public health policies and priorities.

Therefore, an accurate and reliable traffic injury data can help inform decision-makers, stakeholders and the public in general about the magnitude of the problem. **An efficient national surveillance system is therefore a must for Mauritius.**

7.2 Recommendations

The survey results clearly demonstrate that roads in Mauritius are fairly safe and excessive speed and drink driving are the major causes of road crashes. The following actions are recommended in view to enhance road safety in Mauritius thereby decreasing the burden of injuries:

- In regard to data quality, efforts are needed to establish improved injury surveillance systems through existing institutions within the Ministry of Health and Land Transport. Accurate data will help to determine the exact nature and extent of the burden. This will be useful for the identification of trends and to the design and evaluation of prevention programs and will help to define future policies and actions to prevent and control traffic injuries.
- Engineering measures should be designed at raising the priority given to pedestrians. Some of them may include:
 1. reducing traffic speeds to levels appropriate to prevailing conditions;
 2. provision of wider and unobstructed footpaths;
 3. provision of adequate crossing facilities to satisfy both the convenience of pedestrians and safety requirements.
- Modifying the road environment with engineering measures will not be sufficient to address the road safety problem. Education, training, publicity and encouragement (ETPE) programmes can bring, in the long term, the necessary shift in behaviour that is required. Some of the main elements of ETPE programmes could include:
 1. using the media to inform and advise road users
 2. developing practical skills required to use the roads safely
 3. instilling responsible attitudes while still at school.

References

1. Holder Y, Peden M, Krug E et al (Eds). *Injury Surveillance Guidelines*. Geneva, World Health Organisation, 2001.
2. Laflamme L, Svanstrom L, Schelp L. *Safety Promotion Research*, 1999.
3. Central Statistics Office, Mauritius: *Digest of Road Transport and Road Accident Statistics*.
4. Ministry of Health and Quality of Life, Mauritius: *Health Statistics Annual*.
5. BMJ, *War on The Roads*. No. 7346, 11 May 2002.
6. World Road Association and Global Road Safety Partnership: *Keep Death off Your Roads*.
7. Assum T, Road Safety in Africa: *Appraisal of Road Safety Initiative In Five African Countries*, February 1998.
8. Koornskra M, Lynam D, Nilsson G et al: *A Comparative Study of The Development of Road Safety in Sweden, the United Kingdom and the Netherlands*, 2002.
9. Jacobs G, Aeron-Thomas A, Astrop A: *Estimating Global Road Fatalities*, TRL Report 445, 2000.
10. Central Statistics Office, Mauritius, *Economic and Social Indicators*, Issue No.444, March 2004.
11. Welander G, Svanstrom L, Ekman R: *Safety Promotion An Introduction*.
12. Australian Transport safety Bureau, *Community Attitudes To Road Safety*, Community attitudes survey Wave 12, CR 1888, 1999.13. The Royal Society for the prevention of accidents, *Road Safety Engineering Manual*.
14. Ogden, K.W. Safer roads: *Guide To Road Safety Engineering*, 1996.

PUBLIC ATTITUDES TO ROAD SAFETY AND ROAD SAFETY INTERVENTIONS

Thank you for taking time to fill in this questionnaire as accurately as possible. This questionnaire will provide useful data to determine public attitudes towards road safety and road safety interventions in Mauritius. Any information collected will remain strictly confidential and will be used only for research purposes.

Please respond by placing a tick (☑) in one of the boxes unless otherwise required.

A. Sex: 1. Male 2. Female

B. Age: 18-24 25-34 35-44 45-54 55-60 above 60

C. Education. S.C H.S.C Diploma Degree Master PhD

Other, please specify

D. Profession/occupation:

E. What means of transport do you frequently use?

1. Bus 2. Car 3. Motorcycle 4. Other (Please specify)

F. Are you a driver: Yes No

If yes, which type of vehicle do you drive:

1. Bus 2. Car 3. Motorcycle 4. Other (Please specify)

ROAD SAFETY: GENERAL

1. How safe are the roads in Mauritius?

1. Very safe 2. Safe 3. Fairly safe 4. Not safe at all

2. What factors do you think most often lead to road crashes? Below is a list of possible factors. For each factor, please circle the number which according to you best reflect your opinion.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
a. Lack of driver training	1	2	3	4	5
b. Driver fatigue	1	2	3	4	5
c. Poor road signs	1	2	3	4	5
d. Excessive speed	1	2	3	4	5
e. Drink driving	1	2	3	4	5
f. Lack of police enforcement	1	2	3	4	5
g. Bad weather	1	2	3	4	5
h. Poor road design	1	2	3	4	5
i. Poor road lighting	1	2	3	4	5

3. Do you think that the introduction of the penalty point system can help to reduce the number of fatalities in Mauritius?

1. Yes 2. No 3. Don't know

DRINK DRIVING:

4. The amount of alcohol in a person's body can be measured in terms of the "Blood Alcohol Concentration", which is often called the BAC level. Have you ever heard of the term blood alcohol concentration?

1. Yes 2. No 3. Don't know

5. The BAC limit in Mauritius is 50 mg of alcohol in 100 ml of blood. In case a proposal is made to lower this limit to zero so that people should not be allowed to drive if they have been drinking any alcohol at all. Please rate your opinion according to the five-point scale.

1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

6. What is the chance of being breath-tested if drink driving in villages?

1. Very high 2. High 3. Low 4. Very low

7. What is the chance of being breath-tested if drink driving in towns?

1. Very high 2. High 3. Low 4. Very low

8. What is your opinion for automatic loss of licence for a short period of time (e.g. 1 month) for anyone who is caught driving with a blood alcohol concentration twice of that of the legal limit of 50 milligrams.

1. Strongly support 2. Support 3. Neutral 4. Oppose 5. Strongly oppose

9. Please rate the extent to which you believe the following strategies will reduce or prevent drink driving in Mauritius. Please circle the number which according to you best reflect your opinion.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Increasing the costs of alcoholic drinks.	1	2	3	4	5
Providing people who have had too much to drink an alternate way of getting home other than driving themselves.	1	2	3	4	5
Raise public awareness about the dangers of drink driving.	1	2	3	4	5
Increasing police efforts to contravene drunken drivers.	1	2	3	4	5
Making it more difficult to get alcohol at certain times or days of the week.	1	2	3	4	5

SPEEDING:

10. Some road safety authorities believe that the speed limit in residential areas should be lowered from 50 km/h to 40 km/h. Please rate your opinion accordingly.

1. Approve strongly 2. Approve 3. Neutral 4. Disapprove somewhat 5. Disapprove

11. Do you think that the use of speed cameras on roads can be a deterrent to fast driving?

1. Yes 2. No 3. Don't know

12. What is your opinion for automatic loss of licence for a short period of time (e.g 1 month) for speeding at 100 km/h in a 50km zone (residential zone).

1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

13. State whether you agree or disagree with the following statements.

	Agree	Disagree
▪ Fines for speeding are mainly intended to raise revenue for the Government.	<input type="checkbox"/>	<input type="checkbox"/>
▪ Speed limit are generally set at a reasonable limit on main roads in Mauritius.	<input type="checkbox"/>	<input type="checkbox"/>
▪ Rapid increase in fines would decrease the number of crashes on our roads.	<input type="checkbox"/>	<input type="checkbox"/>
▪ People riding bicycles should wear helmets as it is the case for motorcycles and autocycles	<input type="checkbox"/>	<input type="checkbox"/>
▪ The authority should work in close collaboration with the NGO and Civil Society in order to adopt a community approach to tackle the road safety problem in Mauritius.	<input type="checkbox"/>	<input type="checkbox"/>
▪ The authority should stop to construct road humps (speed breakers) along main roads as these are very uncomfortable to passengers and emergency vehicles despite being very effective in speed reduction.	<input type="checkbox"/>	<input type="checkbox"/>
▪ Road Safety should be regarded as a Public Health Issue and not just left as a transport and traffic problem.	<input type="checkbox"/>	<input type="checkbox"/>
▪ Road Safety Education should be introduced in school curriculum in Mauritius.	<input type="checkbox"/>	<input type="checkbox"/>

RESTRAINTS:

14. When travelling in a car, how often do you wear a seat belt in the front seat either as a driver or a passenger?

1. Always 2. Nearly always 3. Sometimes 4. Never

15. When travelling in the rear seat, how often do you wear a seat belt?

1. Always 2. Nearly always 3. Sometimes 4. Never

16. What is the risk of being caught by the police if not wearing a safety belt under the following circumstances? Please circle the number which according to you best reflect your opinion.

	Very high	high	low	very low
▪ Driving	1	2	3	4
▪ Front seat passenger	1	2	3	4
▪ Rear seat passenger	1	2	3	4

ROAD SAFETY CAMPAIGNS:

17. The Traffic Management and Road Safety Unit in collaboration with the Police has recently organized a campaign on road safety. Can you please mention on which issue the campaign was aimed at.

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18. Do you think that the Ministry should continue to organize national road safety campaigns?

1. Yes 2. No 3. Don't know

19. Do you agree with the use of shocking images (e.g. crushed car with dead bodies and blood) in road safety campaigns?

1. Yes 2. No 3. Don't know

ROAD TRAFFIC OFFENCES:

20. Please rate your opinion on the following penalties as per the Road Traffic (Amendment) Act 2003. Please circle the number which according to you best reflect your opinion.

	Very appropriate	Somewhat appropriate	Neutral	Not very appropriate	Not at all appropriate
Drivers caught using mobile phones while driving are liable to a fine not exceeding Rs 3,000	1	2	3	4	5
Non-wearing of seat belts lead to a fine not exceeding Rs 1,000	1	2	3	4	5
Killing a person due to dangerous driving (e.g. speeding): Fine is between Rs 25,000 to Rs 50,000 + imprisonment for a term not exceeding 3 years..	1	2	3	4	5

21. Please rate your opinion on the following penalties as per the Road Traffic (Amendment) Act 2003 for drink driving with alcohol concentration above the prescribed limit. Please circle the number which according to you best reflect your opinion.

	Very appropriate	Somewhat appropriate	Neutral	Not very appropriate	Not at all appropriate
First offence: Fine between Rs 10,000 to Rs 25,000 + imprisonment not exceeding 6 months.	1	2	3	4	5
Second offence: Fine between Rs 20,000 to Rs 50,000 + imprisonment between 6 months to 1 year.	1	2	3	4	5
Causing death: Fine between Rs 25,000 to Rs 50,000 + imprisonment not exceeding 3 years.	1	2	3	4	5

22. Please make any suggestions that could improve road safety in Mauritius.

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Thank You Very Much For Your Cooperation.

Table A: Selected principal causes of death (all ages) in Mauritius, 2002

Cause (I.C.D.1975 Revision)		Number of Deaths			
		Male	Female	Total	
				No.	%
1	Heart diseases	1,340	1,158	2,498	30.9
2	Cerebrovascular disease	669	599	1,268	15.7
3	Diabetes mellitus	199	211	410	5.1
4	Hypertensive disease	1269	157	286	3.5
5	Cirrhosis of liver, liver abscess, chronic liver disease and its sequelae	209	34	243	3.0
6	Pneumonia	144	78	222	2.7
7	Bronchitis (chronic and unspecified), emphysema and asthma	132	83	215	2.7
8	Motor vehicle traffic accidents	178	36	214	2.6
9	Nephritis, nephrotic syndrome and nephrosis	106	95	201	2.5
10	Suicide	102	29	131	1.6
11	Senility without mention of psychosis	44	73	117	1.4
12	Malignant neoplasm of trachea, bronchus and lung	77	32	109	1.3
13	Septicaemia	52	33	85	1.1
14	Malignant neoplasm of female breast	-	80	80	1.0
15	Malignant neoplasm of stomach	46	31	77	1.0
16	Respiratory failure	31	42	73	0.9
17	Gastrointestinal haemorrhage	44	27	71	0.9
18	Malignant neoplasm of uterus	-	57	57	0.7
19	Malignant neoplasm of prostate	56	-	56	0.7
20	Malignant neoplasm of rectum, rectosigmoid junction and anus	27	27	54	0.7
21	Accidental drowning and submersion	37	9	46	0.6
22	Malignant neoplasm of liver and intrahepatic bile ducts	25	15	40	0.5
23	Diseases of polmonary circulation	19	20	39	0.5
23	Accidents caused by fires and flames	15	24	39	0.5
25	Diseases of the arteries, arterioles and capillaries	24	14	38	0.5
Cause (I.C.D.1975 Revision)		Number of Deaths			
		Male	Female	Total	
				No.	%
25	Leukaemia	23	15	38	0.5
25	Alcohol dependence syndrome	38	-	38	0.5
28	Pulmonary congestion and hypostasis	28	9	37	0.5
29	Chronic airways obstruction, not elsewhere classified	27	8	35	0.4
30	Malignant neoplasm of lip, oral cavity and pharynx	26	6	32	0.4
31	Congenital anomalies of heart and circulatory system	20	10	30	0.4
32	Homicide	24	5	29	0.4
33	Ulcer of stomach and duodenum	18	10	28	0.3
34	Epilepsy	16	9	25	0.3
35	Acute pancreatitis	18	6	24	0.3
36	Malignant neoplasm of oesophagus	10	13	23	0.3
36	Anaemia	6	17	23	0.3
38	Malignant neoplasm of pancreas	14	7	21	0.3
39	Malignant neoplasm of larynx	16	2	18	0.2
40	Benign neoplasm of brain	5	12	17	0.2
41	Postinflammatory pulmonary fibrosis	9	7	16	0.2
	All other causes	552	426	978	12.1
	Total	4,555	3,526	8,081	100.0

Source: Health Statistics, Ministry of Health & Quality of Life

Table B: Number of cases treated as inpatients due to motor vehicle traffic accidents by nature of injury and sex – 2000-2002

Ncode	Nature of injury (I.C.D. 1975 revision)	2000			2001			2002		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
124	Fracture of skull, neck and trunk	165	43	208	136	37	173	146	34	180
125	Fracture of upper limb	151	38	189	142	25	167	130	25	155
126	Fracture of lower limb	205	56	261	213	52	265	189	45	234
127	Dislocations, sprains and strains	28	9	37	21	5	26	37	7	44
128	Intracranial & internal injuries, including nerves	409	152	561	339	112	451	286	77	363
129	Open wound and injury to blood vessels	126	17	143	110	21	131	99	22	121
130-135	Other and unspecified injuries	593	196	789	611	166	777	478	164	642
Total		1677	511	2188	1572	418	1990	1365	374	1739

Source: Health Statistics, Ministry of Health & Quality of Life

Table C: Cases treated as inpatients due to injury and poisoning, 2002

External Cause	Hospital							
	Civil	Flacq	Mahebourg	Nehru	Souillac	SSRN	Victoria	Total
Motor vehicle traffic accidents	287	190	10	192	74	435	551	1739
Other transport accidents	0	3	0	1	2	2	98	106
Accidental poisoning by noxious fish	6	10	1	3	0	6	0	26
Accidental poisoning by other substances	88	196	8	69	14	137	177	689
Misadventures during medical care	15	58	0	32	3	43	114	265
Accidental falls	1239	698	169	1315	349	1797	1890	7457
Accidents caused by fires and flames	1	3	2	9	8	9	125	157
Other accidents including late effects	184	124	143	745	484	415	1138	3233
Drugs & medicaments causing adverse effects in therapeutic use	8	17	6	33	9	17	77	167
Suicide and self-inflicted injury	242	134	14	156	54	267	350	1217
Homicide and injury purposely inflicted by other persons	186	123	35	238	27	197	398	1204
Injury or undetermined nature and other violence	0	17	0	36	127	0	135	315
Total	2256	1573	388	2829	1151	3325	5053	16575

Source: Health Statistics, Ministry of Health & Quality of Life