

AFRICA ROAD SAFETY REVIEW

FINAL REPORT



U.S. Department of Transportation

Bureau of Transportation Statistics

Federal Highway Administration

Federal Motor Carrier Safety Administration

Federal Transit Administration

National Highway Traffic Safety Administration

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SUMMARY

A number of studies of road crashes worldwide (Jacobs et al, 2000) carried out by TRL in recent years have shown that the road safety situation throughout the African continent is one of the worst in the world. With approximately only 4 per cent of the world's motor vehicles, its road fatality share is 2 ½ times greater (10%). In several African countries, a motor vehicle is over a hundred times more likely to be involved in a fatal road crash than in the UK or USA.

This is the first review of road safety in Sub Saharan Africa and the objective was to analyse existing data and information on the road safety situation in order to identify the data gaps and priority needs. Based on the poor response received from an earlier survey distributed by the United Nation Economic Commission for Africa (ECA), a shorter survey (restricted to crash data only) was sent to each of the 42 countries. Unfortunately, this too had a low response with less than 20 per cent providing the data requested. Accordingly, the analysis was based on published sources such as the IRF statistics, data identified in the literature review and project reports.

Between 68 and 82 thousand lives are estimated to be lost in road crashes in Sub Saharan Africa in 2000. This estimate has factored in the problem of under-reporting in official police statistics, the traditional source for road casualty data. While the figures are greater than those being reported by the police, they are lower than previous WHO projections.

The current situation in Sub Saharan Africa was reviewed in terms of fatality rate (fatalities per 10,000 motor vehicles) and fatality risk (fatalities per 100,000 population) as well as motorisation level (number of motor vehicles per 1,000 population). With the highest regional motorisation levels, Southern Africa also reported the highest fatality risk. Fatality rates varied significantly within regions with nine countries reporting in excess of 100 fatalities per 10,000 motor vehicles. The East Africa region (Tanzania, Ethiopia, Uganda, Malawi) reported extremely high fatality rates.

Apart from the two largest countries, South Africa and Nigeria, Sub Saharan Africa reported a 42 per cent increase in road fatalities over the past decade. This is less than in previous decades but still cause for concern, especially as the loss appears to be that of working-age men, who are most likely heads of households and responsible for several family members. As could be expected with the low motorisation level, many of the road fatalities were pedestrians or cyclists. Pedestrians accounted for 86% of the fatalities in Addis Ababa and five countries reported over half of all road fatalities to be vulnerable road users (pedestrians or two-wheeled vehicle riders).

Despite Africa's serious road safety record, the region has other more important causes of premature mortality. Road safety is unlikely to become a top medical or political priority in Africa and limited resources can be expected to be available for road safety improvements. Maximum use should be made of the limited resources and lessons should be shared. The recommendations produced relate to the perceived priority areas where needs are greatest and opportunities are being missed. In short, this includes the following: a sectoral needs assessment conducted in-country by local counterparts and priority given to facilitating the use of crash data and accurate location details. Partnerships need to be built between the public and private sectors and civil society and community partnership encouraged. Links need to be strengthened between sectors, especially with the health sector in order to obtain more accurate estimates of the road casualty burden.

Road safety issues need to be integrated into the Road Maintenance Initiative with greater priority given to road safety engineering, especially the use of road safety audits. Increased reliance on user charges to finance safety measures should also be promoted as it will be the road users who benefit and they should share the costs. A central road safety reference system is also needed to allow future work to build on the existing base of knowledge and minimise duplication.

Many of the problems identified were not new, i.e. pedestrian safety, professional drivers and commercial vehicles, but they still remain priorities. The lessons learned in motorised countries, i.e. the neglect of pedestrian safety and need for community participation, should be shared with Africa in the hope that some of the costs of motorisation and development can be avoided.

AFRICA ROAD SAFETY REVIEW

1 INTRODUCTION

1.1 Background

The growing awareness amongst multi-lateral and bi-lateral aid agencies of the importance of road crashes as a major cause of death and disability throughout the developing world is reflected in the recent establishment of the Global Road Safety Partnership (GRSP). This has been set up under the framework of the World Bank's Business Partners for Development Programme and is a partnership of private sectors, civil society and government organisations collaborating to improve the road safety situation in developing and transitional nations.

Following the setting up of the GRSP, the Transport Research Laboratory (TRL) UK was asked to undertake a review of road safety world-wide. This study (which is discussed in this report), identified that the number of people killed in road crashes in 1999 was between 750,000 and 880,000 and that, perhaps surprisingly about 85 percent of these deaths occurred in the developing and transitional countries of Africa, Asia, Latin America and the Middle East. The study also showed that Africa, as a region had a disproportionate share of global road fatalities in comparison with its share of licensed motor vehicles. Estimates also suggest that between 23-34 million people are injured world-wide in road crashes. In this world-wide safety review it was possible to draw on the results of detailed studies undertaken of the road safety situation in the Asia-Pacific region (funded by the Asian Development Bank and the United Nations Economic and Social Commission for Asia and the Pacific), in the Latin America- Caribbean region (funded by the Inter-American Development Bank) and in Eastern Europe (funded by the European Commission PHARE Multi-Country Transport Programme).

Unfortunately no comparable study of road safety in the countries of Africa has been undertaken in recent years, a fact identified by the road safety specialists within the United States of America's Department of Transportation. Clearly the United States has a direct interest in improving road safety overseas both from a humanitarian point of view and also because several hundred American citizens die in overseas road crashes every year with many taking place in Africa. It is also appropriate for the United States as a leader in traffic safety technology to provide assistance to the developing world to reduce traffic-related fatalities and to save lives.

Available data (see later) on crash-related fatality rates world-wide indicate that the problem is particularly severe in crashes of Sub-Saharan Africa. This, coupled with the fact that no detailed regional review of road safety has been undertaken in Africa, led to the decision that a project focusing on the countries of sub Saharan Africa would be set up by the US Department of Transportation's Federal Highway Administration, National Highway Traffic Safety Administration, Federal Motor Carrier Safety Administration, Federal Transit Administration and the Bureau of Transportation Statistics. Consequently TRL was appointed to undertake a review which would evaluate the scope and magnitude of the road safety problem in these countries. In addition the information collected would serve as a basis for subsequent US government aid or technical assistance in this area.

1.2 Scope of work

A summary of the work to be undertaken in Sub-Saharan African Countries (excluding the islands) is as follows:

- 1) Review and summarise existing literature relating to road safety and identify existing databases or other information in these countries concerning road crashes, fatalities and

injuries. The review is to encompass literature in English, French, Portuguese and Arabic but summarised in English.

- 2) Contact identified sources of information to obtain data by country on:-
 - (a) Number, location and type of crash taking place with information on casualty type by degree of severity.
 - (b) The most severe road safety problems.
 - (c) Data on the cost of road crashes.
 - (d) Methods used to collect data; type of information (and quality) collected.
 - (e) Data gaps and needs concerning road safety.
 - (f) Calculation of fatality rates (as road deaths per 10,000 licensed vehicles) and fatality risk (as road deaths per 100,000 people) for a given year for each country.
 - (g) List Principal Road Safety Agencies, Research Institutes and other road data sources.
- 3) Based on the material collected from the various sources available, prepare summary tables presenting available data about motorisation, fatalities, injuries, economic losses and trends by country and sub-region.
- 4) Prepare a final report on road safety in Sub-Saharan African Countries which makes full use of data tables prepared in (3) and which identifies data gaps that need to be filled.

The work commenced in October 1999 with a draft final report made available by June 2000. The countries included in the study are listed below. The work was undertaken by a three-person team from TRL providing about 50 person days total input. (It should be noted that this review of road safety in Africa was very much smaller than, for example the Asia-Pacific or East European studies which were about 15 times larger in terms of staffing inputs and costs).

2 METHODOLOGY

The 42 countries specified under the TOR have been grouped into the following sub-regions which have been used to facilitate the data analysis.

SOUTHERN AFRICA	EAST AFRICA	WEST AFRICA	CENTRAL AFRICA
Angola	Eritrea	Benin	Burundi
Botswana	Ethiopia	Burkina Faso	Central African Rep
Lesotho	Kenya	Cameroon	Chad
Mozambique	Madagascar	Cote d'Ivoire	Congo
Namibia	Malawi	Equatorial Guinea	D R Congo
South Africa	Somalia	Gabon	Mali
Swaziland	Tanzania	Gambia	Niger
Zambia	Uganda	Ghana	Rwanda
Zimbabwe		Guinea	Sudan
		Guinea Bissau	
		Liberia	
		Mauritania	
		Nigeria	
		Senegal	
		Sierra Leone	
		Togo	

2.1 Data Collection

The Terms of Reference for the study request that the most authoritative information by country on the type and location of road crashes taking place, the category of road user involved and the costs of crashes be collected. In order to do this the team have made full use of all sources of data available. These include information obtained from the literature review where a few countries presented conference papers etc based on analyses of national statistics. Other sources of information come from colleagues at TRL who are currently working in Africa and from international publications such as the International Road Federation Annual Handbook (which presents basic statistics on number killed and injured, licensed vehicles etc.).

In previous regional reviews undertaken by TRL and others of countries in Asia, Eastern Europe and Latin America/Caribbean, a detailed questionnaire was devised and sent to the various countries concerned. This requested information both on basic crash and traffic statistics and also on the ways in which various aspects of road safety are dealt with in each country.

About two years ago, in anticipation of a similar project being undertaken in Africa, the UNECA, Addis Ababa, sent virtually the same questionnaire to a number of African countries. About fifty copies were distributed and a somewhat disappointing ten copies were returned and several of these were only partially completed. Of the ten returned, two were for countries of North Africa (Algeria and Morocco) and were not relevant to this particular study (of Sub-Saharan countries).

Once the extent of the information available from the earlier surveys was established, TRL designed a short 3-page version which was sent to the 42 countries included in this study. Although sent by TRL, it was made clear to recipients that the work was being done 'under the auspices of the UNECA' who also advised on the names of key contacts in each country. Unfortunately despite various chase-up faxes, letters and e-mails, very few (10%) completed questionnaires were received.

2.2 Literature Review

TRL maintains a number of international databases of transport and road-based information. Through these, users are able to access abstracts of published reports, conference papers, books and journal articles from 1972 to date. The database also contains detailed information on research in progress in the UK and also in many other countries. As the key source of information on published material on road safety in African countries, the team undertook a computer search of all the information held on the TRL databases.

The TRL Library also participates in the OECD International Road Research Documentation scheme (IRRD) and has access to road and traffic information from a wide range of countries. In addition, the library has access to other external databases of published information which enabled to team to undertake additional library searches on a range of topics, all relating to road safety in Africa.

The team also made direct contact with selected African countries and made use of its own staff currently (or recently) working in African countries as part of their work on road safety in developing countries. Another important source of information were the abstracts and papers produced as part of the recent Third African Road Safety Congress (1997).

2.3 Report Structure

Following the Introduction, Scope of Work and Methodology, Section 3 provides a detailed review of the current situation examining fatality rate and risk in countries for which data were available and, taking under-reporting into account, attempts to estimate the total number of road deaths taking place in the year 2000. It also presents an estimate of the number of road

casualties in Africa in the year 2000. The report then reviews recent trends in road deaths and motorisation on a regional basis and how these inter-relate (Section 4). Section 5 highlights some key characteristics of African road crashes and their associated casualties. Section 6 examines accident costs, Section 7 presents a summary of the literature review and Section 8 provides a summary of findings. The literature review and the contacts database are included in the appendices.

3 THE CURRENT SITUATION

3.1 Estimating Road Deaths in Africa

Previous global or regional reviews of road deaths undertaken by TRL, the World Bank and others have acknowledged the problems associated with data reliability and under reporting. That said, traditional reliance has always been on the use of officially published statistics based on police reports. This study describes the results from these official statistics and then makes a “best” estimate of the real totals using the described correction techniques.

The officially reported number of persons killed in road crashes in the different countries (for the latest year available) are shown in Table 3.1 on the following page. Data are available in most countries for years 1996 to 1998 but in a few such as Angola, Niger, Sudan and Liberia, the latest year was as far back as 1985. In some countries the reported deaths are very low, for example 22 in Chad, 43 in Gabon, 58 in Central African Republic. There may indeed be relatively few road deaths in these countries but it is much more likely that they are significantly under-reported.

Two countries alone account for almost fifty per cent of all reported deaths, namely South Africa and Nigeria. The South African value of over 9,000 appears to be consistent over time. For example, it was at about the same value in the mid 1980's. Nigeria on the other hand at 6,185 deaths is now showing a dramatic reduction from a high of over 9,200 just a few years ago. This recent figure must be treated with caution in that it is unlikely that a large amount of investment in road safety activities has taken place in recent years resulting in this dramatic reduction. Other countries also showing significant numbers of deaths include Ethiopia, Kenya, Uganda and Ghana. The 42 country total of 35,394 deaths and the individual national totals are significant underestimates of the true totals.

To improve the estimate of the current fatality situation in Africa, four additional correction steps need to be undertaken. These are:

1. Updating the fatality figure from the latest year available (which ranged from 1985 to 1998) to the year 2000.
2. Estimating for those countries where fatality data was not available at all.
3. Adjusting for the under-recording of fatalities by the police when the official database does not include all fatalities notified to the police.
4. Adjusting for the non-reporting of fatalities by the public, i.e. where the police are not notified of the incident.

This correction process was developed as part of a global review undertaken by TRL for the GRSP (Jacobs et al, 2000) and the results for each stage are described in Appendix A.

Table 3.1 Road safety summary statistics

<i>Country</i>	<i>Year</i>	<i>Fatalities</i>	<i>Injuries</i>	<i>Motor Vehicles 1996</i>	<i>Fatality Rate *</i>	<i>Pop. 1996 (000's)</i>	<i>Fatality Risk **</i>	<i>Motorisation Level ***</i>
EAST AFRICA								
Eritrea	1996	129		35,441	36	3,840	3	9
Ethiopia	1998	1,693	7,455	85,047	199	58,470	3	1
Kenya	1995	2,617	22,993	359,000	73	25,480	10	14
Madagascar	1995	25	823	78,210	3	15,200	1	5
Malawi	1996	1,382	3,849	56,430	245	11,640	12	5
Somalia	1996			7,520		10,450		1
Tanzania	1998	1,583	11,381	139,000	114	30,000	5	5
Uganda	1997	1,575	6,212	130,785	122	19,848	8	7
CENTRAL AFRICA								
Burundi	1996			37,240		6,720		6
Central African Rep	1995	58	519	643	902	3,208	2	0
Chad	1993	22	427	26,000	8	3,280	1	8
Congo	1994	124	903	53,000	23	2,640	5	20
D R Congo						48,040		
Mali	1996			44,550		9,100		5
Niger	1998	245	2,050	53,460	46	10,000	2	5
Rwanda	1994	483		30,070	161	9,300	5	3
Sudan	1986	665	6,055	338,000	20	32,670	2	10
SOUTHERN AFRICA								
Angola	1985	132		232,000	6	11,520	1	20
Botswana	1998	453	6,430	82,223	55	1,480	31	56
Lesotho	1993	326	1,650	37,620	87	2,220	15	17
Mozambique	1997	805	5,686	12,350	652	18,620	4	1
Namibia	1996	127	3,436			6,720	2	
South Africa	1998	9,068	128,440	5,667,000	16	47,000	19	121
Swaziland	1996	290	1,659	63,461	46	938	31	68
Zambia	1996	928	5,564	237,000	39	10,450	9	23
Zimbabwe	1996	1,205	18,070	355,000	34	11,400	11	31
WEST AFRICA								
Benin	1996	412	2,970	45,830	90	5,592	7	8
Burkina Faso				56,430		10,560		5
Cameroon	1994	840	5,312	162,000	52	13,300	6	12
Cote d'Ivoire	1995	575	16,700	456,000	13	16,150	4	28
Equatorial Guinea				2,040		460		4
Gabon	1994	43	872	41,000	10	1,420	3	29
Gambia				17,640		1,060		17
Ghana	1998	1,646	11,083	135,000	122	19,200	9	7
Guinea	1993	423	3,906	35,000	121	7,120	6	5
Guinea Bissau				12,740		1,260		10
Liberia	1987	80	294	41,160	19	3,560	2	12
Mauritania				29,400		2,400		12
Nigeria	1995	6,185	13,329	1,379,000	45	65,500	9	21
Senegal	1995	791	8,783	119,887	66	8,572	9	14
Sierra Leone	1997	135	1,062	26,104	52	4,550	3	6
Togo	1996	310		23,494	132	4,150	7	6
TOTAL (42 countries)		35,375	297,913	10,743,775		575,088		

* Fatalities per 10,000 vehicles

** Fatalities per 100,000 population

*** Vehicles per 1,000 population

3.1.1 Current fatality estimate for Sub-Saharan Africa

Based on the methodology described in Appendix A, a realistic estimate of total road deaths for the 42 African countries is between 68,500 and 82,200 for the year 2000. The calculations and totals are presented in Table 3.2.

Table 3.2 Estimated road deaths for the year 2000 with under-reporting (UR) adjustments

Step	Adjustment applied	Total (42 Country)
1	Officially reported deaths	35,265
2	Adjusting to year 2000	39,700
3	Adjusting for countries not publishing road deaths	47,640
4	30 day adjustment (1.15)	54,800
5a	Under reporting adjustment (a) (minimum 1.25)	68,500
5b	Under reporting adjustment (b) (maximum 1.50)	82,200

3.1.2 Road crash injury estimate

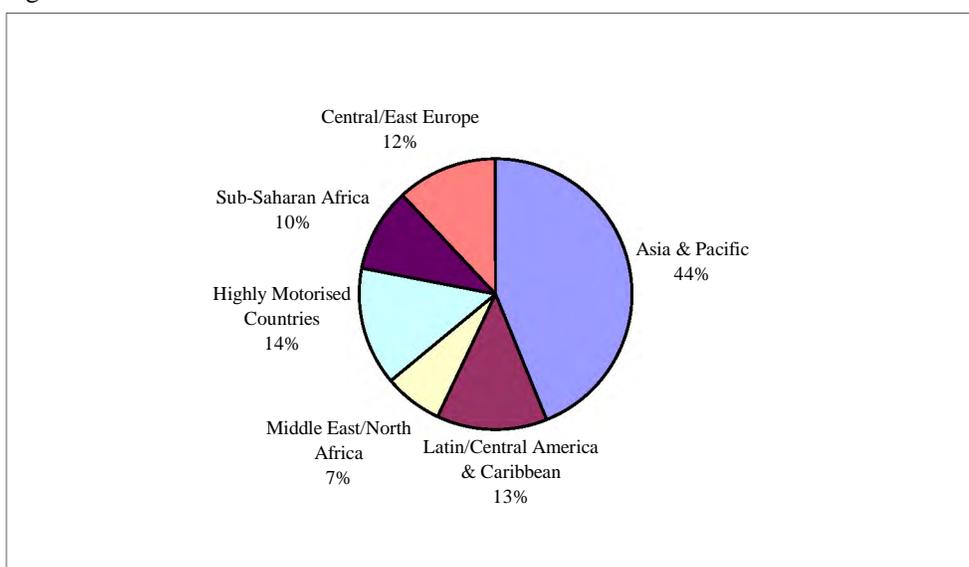
Recent research by TRL has highlighted the extent of under-reporting of road deaths in the developing world (see earlier). However, it is also appreciated that the extent of under-reporting of serious and slight injuries from road crashes is even greater and that fatalities represent only the tip of the injury pyramid.

The recent GRSP “Estimating Global Fatalities” suggested a road injury: fatality ratio of 30-40 for low income countries (LIC's) (injuries implying medical treatment was required and/or loss of normal activity for at least one day). At present, police statistics report approximately 8.5 injuries for every road fatality and the estimate for the true likely injury burden is closer to 2.0 to 3.3 million, some 7-11 times that of the number of road injuries reported by the police.

3.1.3 Africa in Perspective

As stated previously, the methodology used was based on TRL's study undertaken for the GRSP which was a global review for the year 1999. Results from this study can be used to set Africa in the global perspective in terms of road deaths. The burden of road fatalities is on the developing world where 86 per cent of the world's road fatalities occur, with almost half of all fatalities in Asia. Figure 1 shows the regional distribution of 750,000 fatalities, the low end of the range estimated for 1999 (750,000-880,000).

Figure 3.1 Global distribution of road deaths



From this it can be seen that about 10 per cent of global deaths occur in Africa which is slightly less than those for the entire developed world or for all of Latin America, Central America and the Caribbean.

The GRSP study can also be used to show the regional share of fatalities, population and motor vehicles world-wide (see table 3.3)

Table 3.3 Distribution of estimated road deaths, motor vehicles and population

Region	Fatalities	Motor Vehicles	Population
Sub-Saharan Africa	10%	4%	10%
Developed World	14%	60%	15%
Asia/Pacific	44%	16%	54%
Central & Eastern Europe	12%	6%	7%
Latin America/Caribbean	13%	14%	8%
Middle East/North Africa	7%	2%	5%

Firstly it can be seen that whilst about 10 per cent of global road deaths took place in 1999 in Sub-Saharan Africa only 4 per cent of global vehicles are registered in the region. Conversely it can be seen that only 14 per cent of road deaths occurred in the entire developed world (North America, Western Europe, Australasia and Japan) yet this particular region contains 60 per cent of all globally registered vehicles.

3.2 Reported Fatality Rates and Risk

This section attempts to compare the 'seriousness' of the road crash situation in the different countries in the study. Two indicators are used as no single indicator accurately describes the overall road safety situation in a particular country. The most common method used in highly motorised countries is the number of injury crashes per million vehicle kilometres travelled per annum, (thus relating injury to a measure of exposure to traffic). However few of the countries in this study carry out annual traffic surveys which provide information on vehicle usage.

Instead, fatality rates, the number of reported fatalities per 10,000 licensed motor vehicles, are regularly used to compare the road safety records of developing countries. It should be borne in mind however that fatality rate may be of less importance within a specific country than the actual number of deaths taking place. Thus irrespective of the growth in traffic, a particular country should be more concerned at the rise (or possibly fall) in the actual numbers killed and injured.

Fatality risk, the reported number of deaths per 100,000 population is the indicator most commonly used by the health sector to prioritise diseases and other causes of death.

In this section therefore both fatality rates and fatality risks are presented. Clearly both are subject to error in that, as was discussed earlier, the level of under-reporting of road deaths is likely to be considerable in most African countries and also the level of accuracy in reporting national motor vehicle fleet sizes will vary widely.

Figures 3.2 to 3.5 show the fatality rates calculated for the different countries by region. It can be seen that the range is extremely wide with, for example Chad with a rate of 8 and Central African Republic (CAR) with over 270. Bearing in mind that these countries are on the same continent and of reasonably similar economic development, attitude and culture, such variation must cast serious doubt on the figures derived.

For example in the global review for the GRSP referred to earlier, rates for all the developed countries of Western Europe, North America, Australasia and Japan ranged from about 1.5 to

5 and for Eastern European nations ranged from 3 to 40. In the African examples cited above there are probably very many more road deaths than the 22 stated in the official publications for Chad and in the case of CAR there is probably a gross under-reporting of the number of vehicles in use (i.e. many operating illegally and unlicensed).

However, the overall picture that emerges is that fatality rates in most African countries lie in the range 50 to 150. This compares with most Latin American countries which are in the range 10 to 35 or Asian –Pacific countries which are in the range 8 to 37 (results from the GRSP study). Thus whilst some figures are of dubious accuracy, it can be said that the highest fatality rates world-wide are to be found in Africa. Those countries with the highest (and believable) rates, all in excess of 100, include Ethiopia, Malawi, Tanzania, Uganda and Ghana. To put these values in perspective the highest peacetime fatality rate recorded in Great Britain was 32 fatalities per 10,000 motor vehicles in 1930.

Fatality rates are shown in Figures 3.2 to 3.5 on a regional basis. The ranges found in West and Central African countries show the greatest variation with for example three countries in West Africa in excess of 120 and three countries below 20. The lowest rates were for the seven countries of South East Africa, ranging from Angola (10) to Lesotho (87).

Fatality risk levels appear to be more consistent, see Figures 3.6 to 3.9, with most countries in the range 2 to 10. Countries with particularly high fatality risk levels appear to be Botswana, Swaziland, Lesotho and South Africa all, interestingly located in Southern Africa. The region with (marginally) the lowest fatality risk levels is Central Africa, the region with the highest fatality rates.

3.3 Motorisation Levels

In this report, motorisation levels are expressed as the number of officially licensed vehicles per 1,000 population for the year 1996. Values derived range from as low as 0.7 for Central African Republic, Somalia, Mozambique to as high as 120 for South Africa (see Figures 3.10 – 3.13). Vehicle ownership levels are likely to be closely correlated to national GNP/Capita levels and Central African Republic, Somalia and Mozambique are amongst the poorest countries of Africa. However it can be seen that the value for Ethiopia, also a very poor country is 1.5, twice that for those countries with the lowest reported vehicle levels. This may be because teams working in Ethiopia recently were able to obtain a more accurate value for vehicles licensed in that country.

From a regional point of view the highest vehicle ownership levels were to be found in southern Africa with values ranging from over 30 in Zimbabwe, 55 in Botswana, 67 in Swaziland and 120 in South Africa. Next come the two West African countries of Gambia and Gabon with levels of about 17 and 29 respectively.

From a global perspective vehicle ownership levels throughout Sub-Saharan Africa are amongst some of the lowest. For example in western Europe most countries have 500 to 700 vehicles per 1,000 population, in Eastern Europe 100 to 300 and in Latin America 40 to 200. In Asia there is wide variation in vehicle ownership levels ranging from 5 vehicles/1,000 people in Bangladesh to over 500 in Brunei. However 60 per cent of countries were in the range 20 to 60 which is comparable with those calculated for the majority of African countries.

Figure 3.2 EAST AFRICA
FATALITY RATES
(Latest Year Available)



Figure 3.3 SOUTHERN AFRICA
FATALITY RATES
(Latest Year Available)



Figure 3.4 CENTRAL AFRICA
FATALITY RATES
(Latest Year Available)

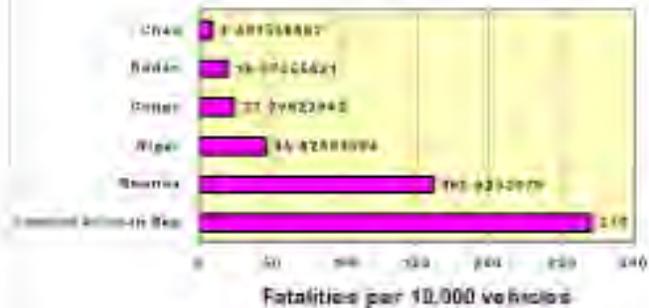
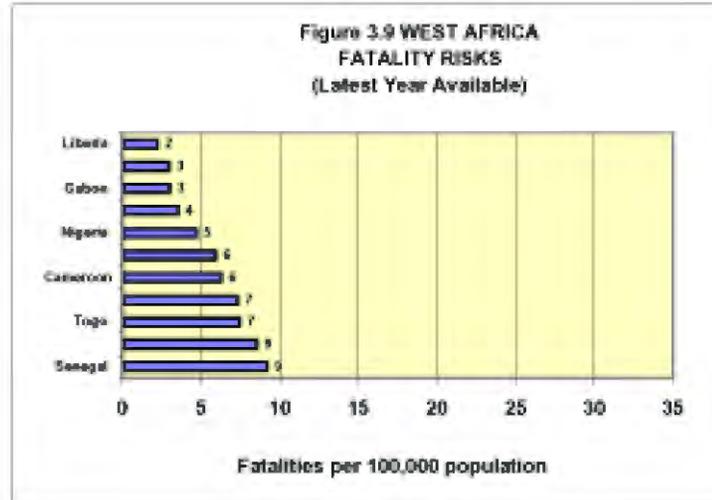
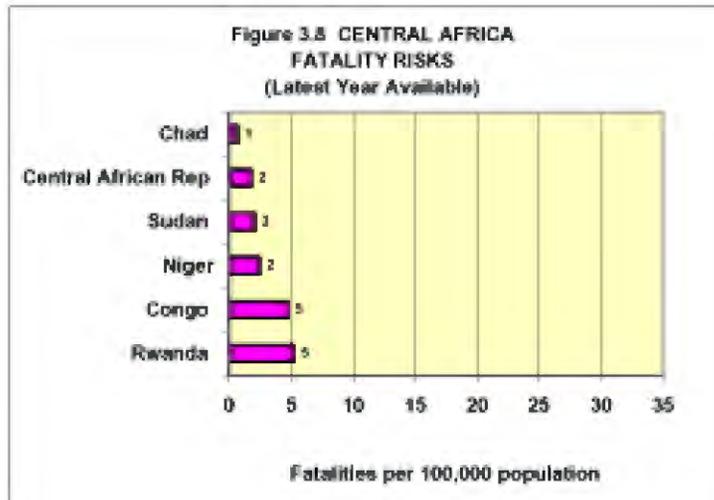
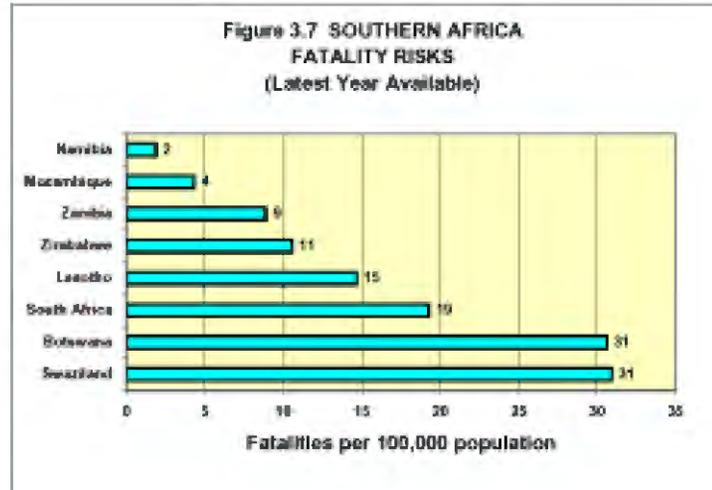
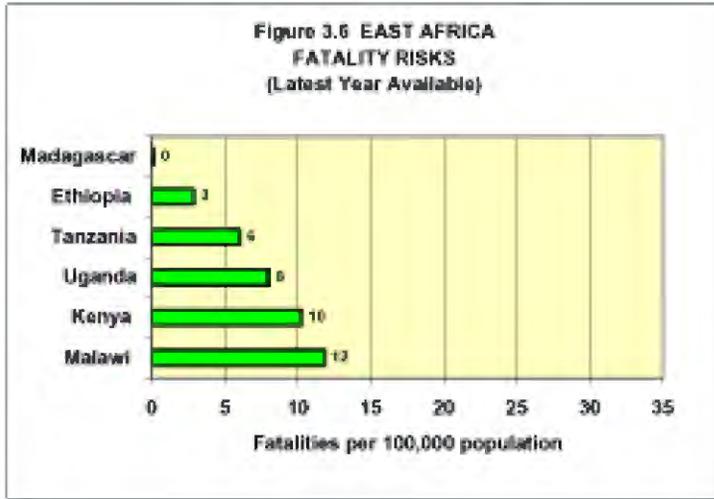
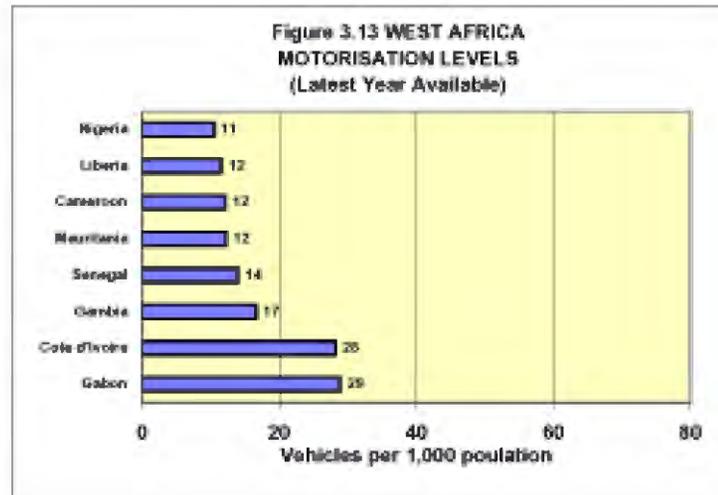
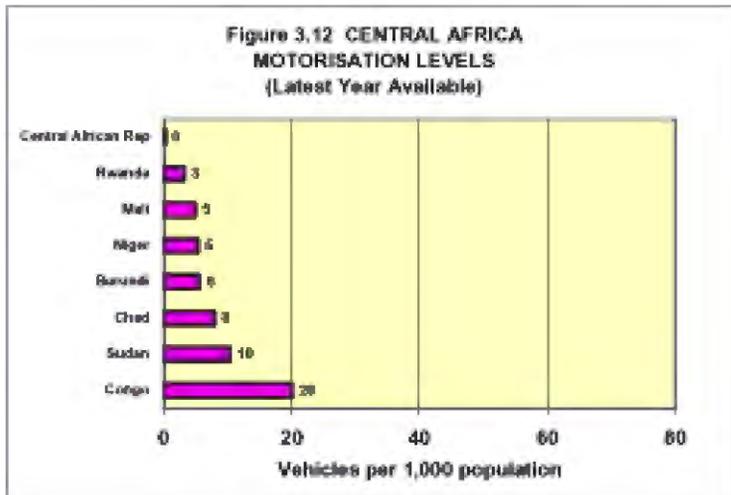
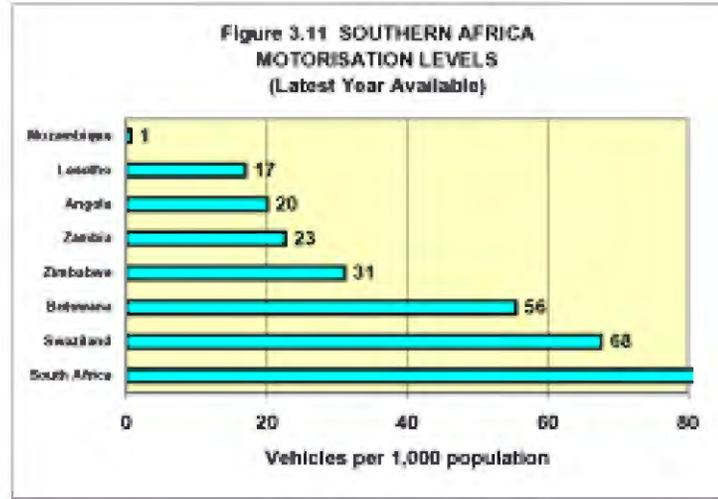
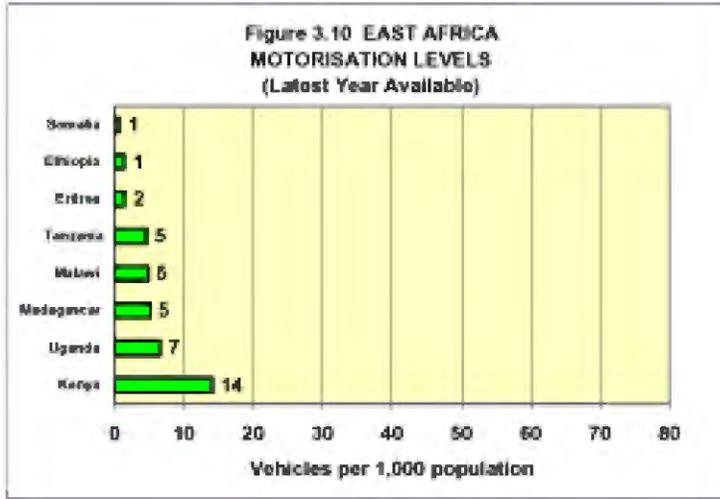


Figure 3.5 WEST AFRICA
FATALITY RATES
(Latest Year Available)







4 TRENDS IN FATALITIES AND LICENSED VEHICLES

Trends in the number of fatalities, vehicles and also population over the period 1985/86 to 1995/96 are given in Appendix B.

4.1 Trends in fatalities

Figures 4.1 to 4.4. show the year to year values of deaths in the different countries by region and it can be seen that only in East African countries are data reasonably complete and showing some of the lowest percentage increase in road deaths over time. From Appendix B it can be seen that there is a very large variation in the change in fatalities over the given ten year period (for those countries where trend data were available). Thus in Uganda there was over a 200 per cent increase in fatalities with Malawi, Benin and Botswana also showing increases of over 100 per cent. Conversely some countries show decreases in deaths from 1985/86 to 1995/96 ranging from two percent in Zambia to over 30 percent in Nigeria.

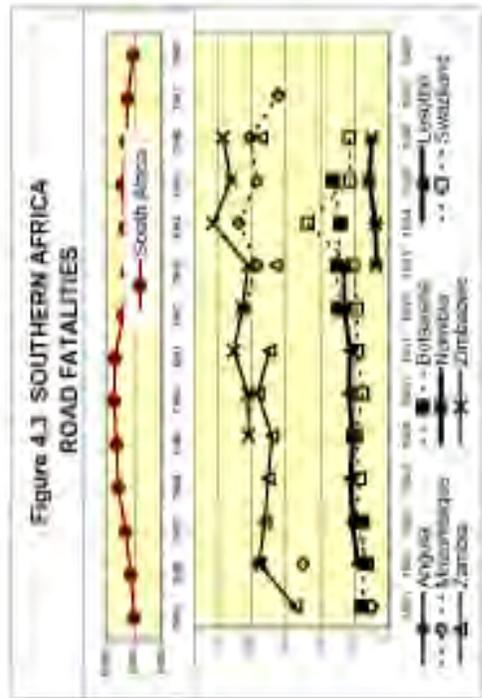
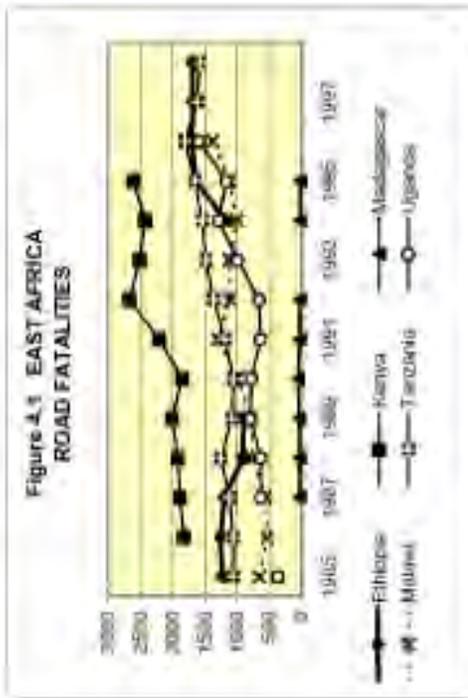
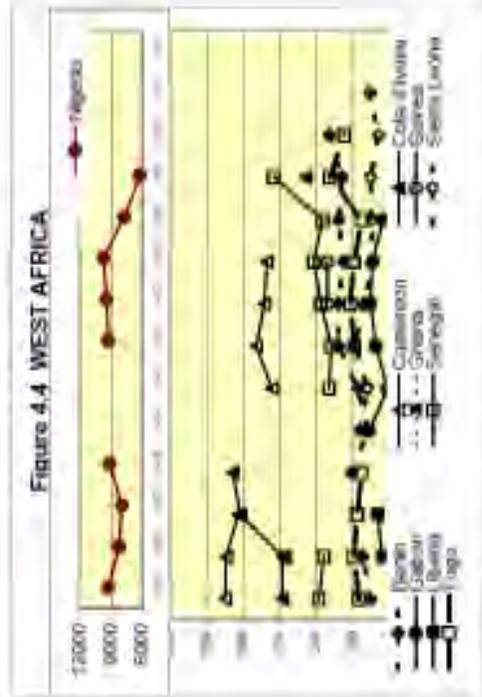
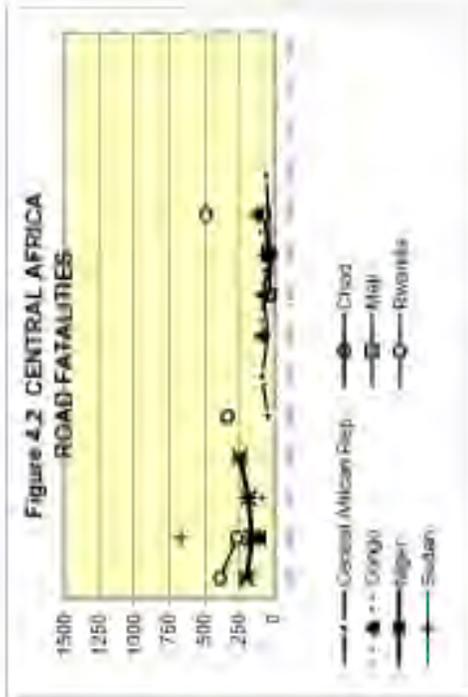
The decrease in deaths in Nigeria over recent years was commented upon in the previous section. Such decreases in road data are possible, for example in the UK where deaths dropped from 6,000 to 3,620 over the period 1980 to 1995. However the methods used to bring about such decreases are well documented and the expenditure in life-saving activities was very considerable indeed. It is difficult to determine whether or not real reductions in road deaths have actually taken place in Nigeria, given the recent economic decline, or whether data recording methods have changed in any way. A detailed investigation of road safety activities in Nigeria is needed before such questions can be answered.

South Africa presents a different situation where road deaths have increased by 5 per cent over the given time period. Efforts made to reduce road crashes in South Africa are again well documented and a 5 percent increase must be set against a 30 percent increase in vehicles over the same period. It is this sort of result that makes the figures presented for Nigeria somewhat suspect.

The overall average increase in road traffic deaths from 1985/86 to 1995/96 in all countries for which trend data were available was found to be 7 per cent. However this value is fairly meaningless from a statistical point of view because the overall value is biased by changes in the two countries of South Africa and Nigeria which have significantly more deaths than the other countries. If these two countries are removed from the analysis then the percentage increase in the other 17 countries where trend data were available was 42 per cent. Those countries showing the greatest increases were mainly in east Africa and south-east Africa and those with the biggest decreases were mainly in west Africa.

Whilst an increase of about 40% over ten years in people killed in road crashes is certainly significant, it is certainly much lower than previous trends found for African countries. Thus in an earlier TRL study (Ghee, Astrop et al 1995) it was found that over the period 1968 to 1983 road deaths in Africa increased by over 250 percent. Caution is needed in comparing this early result with the current study because the members of countries included in the two analyses were not the same. However there is some evidence that very large increases in road deaths over time are now lessening.

This is clearly illustrated in the two major countries of Nigeria and South Africa. As stated from 1985/86 to 1995/6 Nigeria shows a (surprising) decrease in deaths of over 30 percent. Yet from 1960 to 1975 deaths there increased by 400 percent and from 1960 to 1980 by a remarkable 700 percent. In South Africa where in this study the increase over 1985/86 to 1995/96 was 5 percent, earlier statistics show an increase from mid 1960's to mid 1980's of about 120 cent.



4.2 Trends in vehicle ownership

Trends over the period 1985/86 to 1995/96 for 14 countries and for shorter time periods for 4 countries are shown in Appendix B. Figure 4.5 – 4.8 show trends over the more recent period of 1992 to 1996 by region. It can be seen that all countries for which data were available showed increases in licensed vehicles. Those with the greatest increase from 1985/86 to 1995/96 were Zambia (about 340 percent) followed by Uganda (almost 220 percent), Togo (170 percent) and Benin (140 percent). The smallest increases occurred in Senegal (13 percent) and Central African Republic (15 percent).

Zimbabwe illustrates the relationship that exists in any country between economic development and growth in vehicle ownership. For example in Zimbabwe, growth over the given ten year period was amongst the lowest at 26 percent. Over the last ten years the economy of Zimbabwe has had problems and this has clearly affected growth in vehicle ownership.

Trends over the shorter time period 1992 to 1996 are shown, by region in Figures 4.5 – 4.8. It can be seen that highest growth occurred in Uganda (140 percent), Botswana (120 percent) and Burundi (85 percent). (The trend in Togo (not shown) appears peculiar in that from 1992 to 1993 it dropped by 40 percent then increased back to the 1992 level by 1994 then rose dramatically by 1995 by over 200 percent).

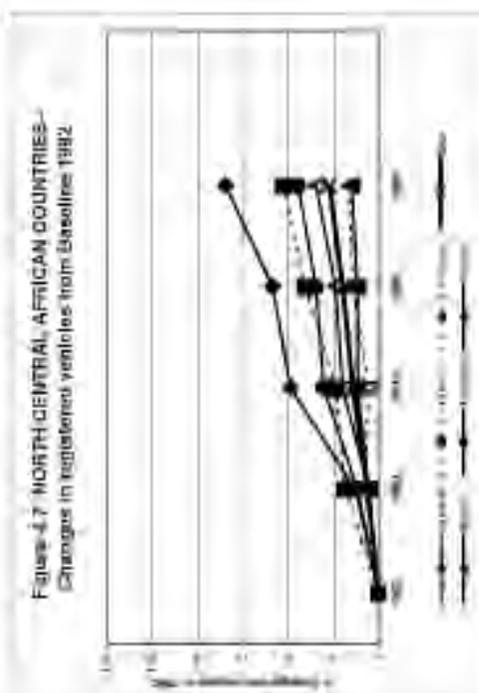
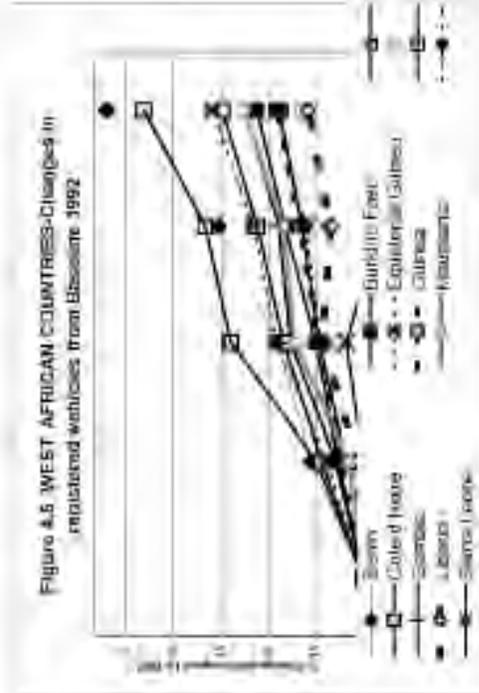
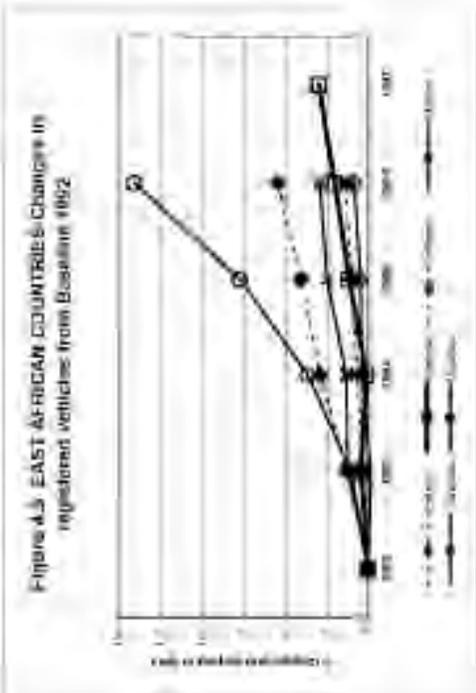
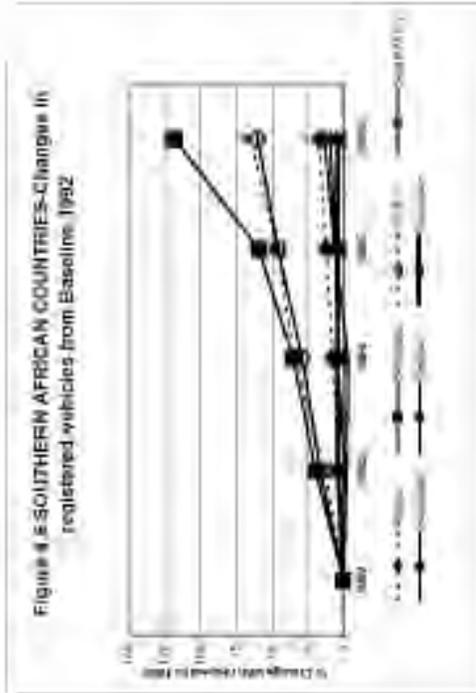
From Figures 4.5 – 4.8 it would appear that there is as much variation within regions as between them. Countries showing the smallest increases of under 20 percent included Kenya, Tanzania, Niger, Congo, Zimbabwe and Swaziland. Sierra Leone actually showed a decrease from 1992 to 1996, attributable no doubt to the civil war taking place in that country.

Some countries, such as Uganda, Benin and Botswana which showed large increases in road deaths over time also showed significant increases in vehicle ownership levels. However some countries such as Zambia and Togo showed relatively small increases in fatalities (Zambia actually showing a decrease) whilst at the same time showing large increases in vehicle ownership levels.

As stated above, changes in vehicle ownership levels in developing countries are closely correlated with economic development. This is not necessarily the case in developed countries where levels of ownership are already high. Thus in western Europe for example where the economy has been sound in recent years, the number of licensed vehicles per head of population has changed very little. This is, of course due to the fact that levels were already high and approaching 'saturation' level. In Western Europe, vehicle ownership levels in the 1990's were already in excess of 500-600 vehicles per 1,000 population in most countries. Conversely, the highest vehicle ownership level found in the African countries studied was 120 (South Africa), whilst in most it was in the range 10-20 per 1,000 population. Thus for many African countries the potential exists for continuous rapid growth in vehicle ownership, accompanied by the inevitable rise in road deaths and injury. It is essential therefore, at the current level of social and economic development, that the countries of Africa begin to increase their level of investment in crash prevention and reduction measures.

4.3 Population Growth Rates

Finally Appendix B provides information of population growth rates and it can be seen that between 1985/86 and 1995/96 the population of some African countries was very high indeed. For example in South Africa, Malawi, Cote d'Ivoire and Rwanda population increases were at or in excess of 50 percent. The fact that in some countries growth over that period was 'only' 25-30 percent probably reflected the rapid growth that took place in earlier years. Kenya and Nigeria would be examples of this.



In many developing countries there is a shift from rural to urban areas. For example the population in Lagos, Nigeria was estimated to be 10 million in 1995. UN forecasts are that by the year 2015 it will grow to almost 25 million which would make it the world's third largest city. This makes the potential for vehicle ownership (per head) even greater in future years and from a road safety point of view means that growth in urban deaths and injury might grow at an even faster rate than national trends might suggest.

5 CRASH CHARACTERISTICS

This section offers a summary of some basic characteristics of the reported road crash and casualty situation in Africa. The analysis was conducted on the data collected, which was from a limited number of countries and based on police statistics. The main data source were the completed questionnaires, project reports, annual road crash reports (Ethiopia and Botswana) and MAAP (micro computer accident analysis package) country databases (Botswana and Zimbabwe).

5.1 Urban crashes

As road crashes are limited to those areas with roads and vehicles, road safety is unlikely to be a priority in rural areas and is more likely to be an urban or a highway corridor problem. The limited data available (See Table 5.1) found no simple correlation between urbanisation and the share of urban road crashes. Urban areas are assumed to have better reporting procedures and this is believed to explain the large share of urban casualty crashes reported in South Africa and Zimbabwe.

Table 5.1: Urban share of road crashes and population

Country	Years	Urban population (1997)	Urban Crashes			
			Fatal	All	Casualty	Damage only
Botswana	1994-98	48%	20%		36%	45%
Ethiopia	1997/98	16%	40%		57%	85%
South Africa	1998	45%	59%		80%	92%
Zimbabwe	1996-98	31%	40%		69%	78%

Urban areas, with their lower operating speeds, will account for a larger share of urban casualty crashes than fatality crashes. Damage only crashes appear to be concentrated in urban areas with relatively few being reported outside urban areas in Ethiopia, South Africa or Zimbabwe.

5.2 Road casualties

Pedestrians account for the largest fatality class in six of the eight countries shown in Table 5.2, only Botswana and Zimbabwe report more passenger fatalities than pedestrian fatalities. In over half the countries shown, drivers account for a small share of fatalities, less than 10 per cent. South Africa reported the largest share of driver fatalities but it was still less than one of every three fatalities.

Table 5.2 Road fatality by casualty class

	Year	Fatalities	Pedestrians		Bicyclists		Motorcyclists		Drivers		Passengers	
			No.	%	No.	%	No.	%	No.	%	No.	%
Botswana	1998	465	134	29%	10	2%	2	0%	105	23%	214	46%
Ethiopia	1997/98	1,693	859	51%	12	1%	10	1%	92	5%	720	43%
Kenya	1998	2,972	1265	43%	285	10%	37	1%	275	9%	11	37%
South Africa	1998	9,068	3452	38%	N/a	N/a	N/a	N/a	N/a	30%	2875	37%
Tanzania	1997	1,625	663	41%	227	14%	40	2%	90	6%	605	36%
Uganda	1998	1,575	585	37%	303	19%	78	5%	99	6%	510	32%
Zambia	1996	842	416	46%	70	8%	N/a	N/a	75	8%	343	38%
Zimbabwe	1998	2,152	668	31%	123	6%	26	1%	543	25%	792	37%

As shown in Figure 5.1, vulnerable road users, i.e. pedestrians and two-wheel vehicle riders (both bicycles and motorcycles) constitute over half of all road fatalities in five of the eight African countries shown. While motorcyclists accounted for very few road fatalities, cyclist fatalities were significant in Uganda (almost one of every five fatalities), Tanzania and Kenya. (In the USA, France and Germany for example, vulnerable road users constitute about 13 per cent of all casualties).

Figure 5.1 Vulnerable road user fatalities (1996-98)

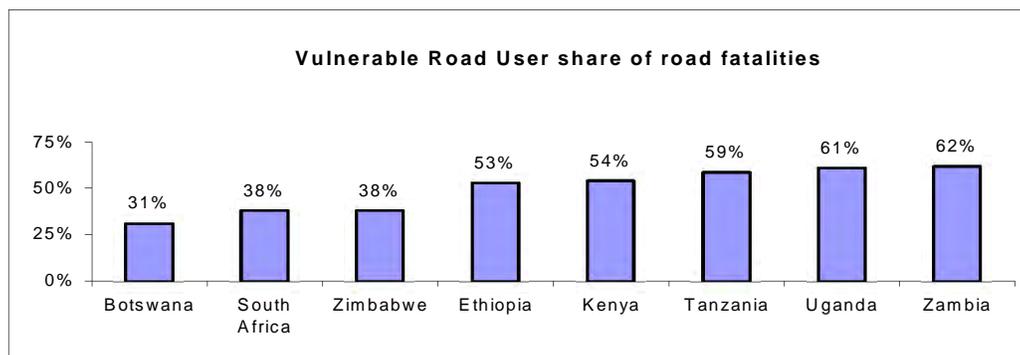


Table 5.3 below shows the pedestrian casualty involvement to be even higher in urban areas, as could be expected. Only in Botswana were pedestrians a minority of road casualties. Table 5.3 also shows a relatively high casualty rate for urban crashes and the difference in the number of road being reported in African countries. Zimbabwe, where police reporting is believed to be given much priority and where ambulances are coordinated through the police, reported both the lowest casualty rate and the highest injury:fatality ratio, thus suggesting greater priority was being given to slight injury crashes where only one person was injured.

Table 5.3 Urban road casualties

Country/City	Years	Pedestrian		Average no. of casualties per casualty RTC	Average No. injuries per fatality
		Fatalities	Total Casualties		
Addis Ababa, Ethiopia	1997/98	86%	85%	1.6	12
Botswana (urban)	1994-98	39%	23%	1.7	16
Kumasi, Ghana	1995	58%	33%	1.9	13
South Africa (urban)	1998	50%	31%	1.4	18
Zimbabwe (urban)	1996-98	60%	52%	1.4	22

5.2.1 Socio-economic characteristics of road casualties

Road crashes tend to strike males in the prime of life, when they are likely to be at the peak of economic and social importance as head of a household. Over 75 per cent of casualties for the three countries shown in Table 5.4 were of working age, i.e. between 16 and 65 years. Those aged over 65 accounted for a small share of road casualties while children tended to be injured as pedestrians, as many as 30 per cent of Botswana's pedestrian casualties were under age 16.

Table 5.4 Age distribution of road fatalities

	all classes			Pedestrians only		
	Zimbabwe	Ethiopia	Botswana	Zimbabwe	Ethiopia	Botswana
under 16 years	10%	14%	18%	18%	21%	30%
16-19 years	14%	9%	7%	16%	10%	9%
20-65 years	72%	77%	71%	61%	70%	51%
over 65	4%	0%	3%	6%	0%	10%

Note: Botswana's total fatality data for 1996 while pedestrian fatality data is for 1997

Gender distribution

The recent TRL global fatality study found females to rarely account for more than 25-30 per cent of road casualties in developing countries. Ethiopia reported a relatively high female casualty involvement rate (34%) whereas in Zimbabwe, females represented 14 per cent of road fatalities (1998) and this rate was confirmed by hospital studies (Aeron-Thomas, 2000). Females tend to have a higher pedestrian involvement rate; Botswana recently reported females accounting for as high as one-third of all pedestrian fatalities and 43 per cent of all pedestrian casualties. Only 6 per cent of driver casualties were females in Ethiopia (TRL, 2000).

While women may account for relatively few casualties, they suffer as secondary victims with the loss of husbands or fathers as they will be left in much more precarious position in terms of society and financial security. Likewise, children suffer not only when they are injured or killed in road crashes, but also are impacted by the social and economic loss of a parent.

Road crashes and the poor

Very few countries monitor the income level or occupation status of their road casualties. Studies in the UK have shown children of lower income families to be several times more likely to be injured in a road RTC. Increased exposure contributes to this problem with poor families unable to afford to live away from busy roads.

A practical assumption is that whilst not all pedestrians are poor, the poor will be pedestrians. The DFID funded Pedestrian Vulnerability/Accidents Study surveyed both pedestrian victims and pedestrians (as a control group) to ascertain the associated socio-economic characteristics.

The share of the lowest income group, both personal and household, from four cities in LICs shown in Table 5.5. Pedestrian victims were reported to be much poorer than the control sample in Colombo, Accra and Bangalore and slightly poorer in Harare.

Table 5.5: Socio-economic characteristics of pedestrians (sample size shown in brackets)

	No personal income		No household income	
	Casualty	Control	Casualty	Control
Accra	64% (105)	30% (36)	25% (41)	9% (10)
Harare	37% (291)	34% (118)	13% (105)	8% (29)
Bangalore	36% (184)	24% (475)	40% (206)	16% (307)
Colombo	43% (190)	29% (138)	7% (27)	2% (8)

Source: WS Atkins 1998

As with females and children, the impact on the poor should not be measured by the casualty rate alone. The poor will be less likely to accommodate the impact of a road death or serious injury as there will be little savings available and repercussions on other family members can be expected, particularly with women bearing the burden of care.

5.3 Crash characteristics

5.3.1 Vehicle type involvement

As shown in Table 5.6, apart from low motorcycle involvement, there appears to be little consistency between the vehicles involved in casualty crashes for the 7 countries shown below. Lorries and vans are heavily involved in casualty crashes in Kenya and Botswana (pick-ups included with lorries), whereas Tanzania has higher involvement from cars and buses. Ongoing public transport safety research in Tanzania has highlighted the high involvement rate of private buses in urban areas (98% of all public transport vehicles involved in crashes) (Rwebangira et al, 1999).

Table 5.6 Crash involvement of vehicle type

All casualty crashes	Year	Cars		Lorries/vans		Buses/minis	
		No.	%	No.	%	No.	%
Malawi	1992	1,405	35%	1,715	42%	340	8%
Kenya	1998	5,276	54%	1,237	12%	2,973	28%
Botswana	1997	1,237	26%	3,056	60%	626	12%
Tanzania	1998	5,788	45%	584	5%	5,246	40%
Ethiopia	1998/98	4,739	36%	3,448	26%	1,212	9%
Zimbabwe	1996	4,752	55%	2,339	27%	932	11%
South Africa	1998	541,779	63%	187,530	22%	79,003	9%

*includes all crashes (damage only)

A vehicle type's crash involvement rate may be explained in part by its share of the motor vehicle fleet. Table 5.7 compares the crash involvement rate of commercial vehicles with that of their vehicle fleet share in three African countries. Cars did not have a consistent pattern while lorries had a lower crash rate in two countries. The key finding was the high crash involvement of buses. In South Africa, their crash involvement rate was over twice that of their fleet share, in Botswana it was 3 times and in Kenya, buses were 3 ½ times more likely to be involved in a crash than their fleet share.

Table 5.7 Vehicle type involvement comparison

	Cars		Lorries/vans		Buse/minis	
	fleet	crash	Fleet	crash	Fleet	Crash
Kenya	47%	54%	36%	12%	8%	28%
Botswana	36%	26%	58%	60%	4%	12%
South Africa	61%	63%	31%	22%	4%	9%

5.4 Contributory factors

Many crash reporting systems in Africa do include contributory factors, and the results from three countries are shown in Table 5.8.

Table 5.8 Contributory factors in road crashes

	Ethiopia* 1997/98	Tanzania 1998	Zimbabwe 1998
Negligence of driver	44%	70%	28%
Speeding	16%	3%	10%
Negligence of pedestrians	5%	6%	7%

*Data refers to traffic violations associated with crashes

Table 5.8 refers to all road crashes, i.e. damage only included, although Zimbabwe reported higher involvement with speed and pedestrian error in injury crashes with almost one of every four injury crashes being caused by pedestrians.

However, these findings need to be put into context as:

- This information will be recorded at the initial, pre-investigation stage by police officers with little crash investigation training.
- Single causes are usually listed and this oversimplifies the reality of most crashes.
- Without adequate location data, the role of the road environment will be underestimated.
- Traffic police are often inclined to cite the motorised road user as being at fault as he will most likely be in a better position to pay compensation than would a pedestrian or cyclist.

A different approach was recently undertaken in South Africa where the Portfolio Committee on Transport in South Africa conducted provincial tours where public hearings and meetings were organised with provincial officials to discuss the causes of road crashes. Some 12 main causes were highlighted but these appeared to be subjective, i.e. cell phones, involvement of the police in the taxi industry, tire blowouts as well as irresponsible and reckless driving, high speed, etc.

6 ECONOMIC COST OF ROAD CRASHES IN AFRICA

6.1 Introduction

As part of the recent project undertaken on behalf of the Global Road Safety Partnership (GRSP), mentioned earlier in this report, it was estimated that the global cost of road crashes in 1999 was in excess of US \$500 billion and the cost in the developing world was estimated to be about US \$65 billion. Road crashes therefore are costing developing and transitional countries huge sums each year that they can ill afford to lose.

Detailed studies undertaken in the UK and elsewhere in the developed world indicate the high rates of return that can be obtained from the application of low cost traffic management techniques at sites where significant numbers of crashes take place. Results from studies undertaken in the developing world are now showing similar results (Baguley 1995). Thus apart from the essential task of reducing road deaths and injuries in developing countries, a sound case can be made for reducing road crashes in African countries on economic grounds alone.

A recent (unpublished) report undertaken by TRL and Ross Silcock for DFID (UK) reviews how the methodology used for costing road crashes in developing countries can be improved. This makes the point that even within the transport sector alone, hard decisions have to be taken on the resources that a country can devote to road safety. In order that this decision-making process has a rational basis, it is important that a consistent and soundly based method be used to determine the cost of road crashes and the value of preventing them.

Thus the first need for cost figures in African countries, is at the level of national resource planning to ensure that adequate investment in road safety takes place in a given country. It helps at the national planning level therefore to provide decision makers with an estimate of the annual cost of road crashes. For example, in a study undertaken by TRL in the early 1990's (unpublished) the annual cost of crashes in Mauritius was calculated to be US\$32 million. A series of recommendations were outlined at a total cost of US\$800,000 spread over a five year period which could reduce crashes (and hence costs) by 5 per cent p.a. (i.e. saving US\$1.6 million p.a.). Thus the average first year rate of return on investment was estimated to be 1000 per cent. High rates of returns such as these are in fact, fairly common in road safety appraisals, and indicate clearly the value to be obtained in crash-reducing measures.

Conversely a review of road safety in Ethiopia by a joint TRL - Ross Silcock team estimated that the annual cost of road crashes was about Birr 400 million p.a. Thus it is reasonable to suggest that at least 10 per cent of this sum be spent on a crash reduction programme each year. However a proposal that 2 per cent of a newly established Road Fund, (about Birr 8 million) be spent on a comprehensive crash reduction programme each year was actually rejected. Bearing in mind the annual cost, of about Birr 400 Million an investment of say Birr 40 million (i.e. 10 per cent of the annual cost) would not have been unreasonable.

One particular problem might be that road safety in developing countries is not seen as the key priority for any specific organisation. Thus, from a highway and transport point of view, the main priority is that of maintenance and for the health sector the main priorities in Africa are AIDS, malaria, etc. Whilst there is a desire to see road deaths and injuries reduced, there is, in virtually all countries, a lack of investment in crash-reduction programmes.

A second need for crash cost figures is to ensure that the best use is made of any investment and that the most appropriate improvements are introduced in terms of their cost-effectiveness. If specific costs and benefits are not applied to crashes taking place then widely different criteria in the choice of measures, the assessment of projects and the allocation of resources will result. As a consequence there will be an imbalance in the ways in which funds available for safety projects are allocated and also an overall under-investment in road safety.

Details of how road crashes can be costed in developing countries (together with associated problems) are given in the TRL Report, Overseas Road Note 10. Basically it is important that crashes are costed by degree of severity (i.e. fatal, serious, slight and damage-only) and that the Human Capital approach is used with sums included to reflect the pain, grief and suffering of those involved and also their loved-ones. An unpublished report to DFID explains the difficulties associated with the costing procedure, particularly the difficulties in obtaining accurate information on lost output and property (mainly vehicle) damage and also assessing a realistic value for pain, grief and suffering. (Another critical factor, discussed earlier in this report, is the under-reporting of road crashes, particularly those not involving a fatality).

6.2 Crash costing in Africa

There are relatively few examples available of efforts made to cost road crashes in African countries. Those countries where results are available include Zambia, Botswana, Kenya, Tanzania, Ethiopia and South Africa. All countries used the Human Capital approach (also known as the Gross Output method), or a variation of this method, and some included sums to reflect the pain, grief and suffering involved (see above). More details of crash costing in Africa can be found in Appendix C: Literature Review.

One way of comparing results from different countries is to express total annual national costs derived, (where costs by category of fatal, serious, slight and damage-only are multiplied by the numbers of those classes of road crashes taking place) as a percentage of Gross National Product (GNP) per annum. Early work by Jacobs and Fouracre (TRL, 1978) showed that road crashes cost any country, be it developed or developing, about one percent of GNP per annum. For many years this value has been used to provide a crude estimate of road crashes either on a national, regional or global basis. Evidence is beginning to emerge, however, that the annual cost of road crashes, certainly in the more wealthy countries, may be closer to two percent of GNP than one percent

Estimated costs in those African countries above show that, as a percentage of national GNP, costs range from about 0.8% in Ethiopia and 1% in South Africa to 2.3% in Zambia and 2.7% in Botswana to almost 5% in Kenya and the Kwa Zulu region of South Africa.

Costing road crashes, deaths and injuries is a difficult and contentious topic and any value derived is better for investment in life-saving activities than no value at all. It should be appreciated, however, that any value is likely to be little more than an estimate of the 'real' value.

Even in the west there is no simple method consistently used by all countries and comparisons should be treated with caution. Results which range from 1991 to 1998 suggest that in developed countries costs range from a low of 1.1% of GNP (Denmark) to 4% (New Zealand). Costs derived in different countries are in fact higher if the "willingness to pay" approach is used as opposed to the "Human Capital" method.

From the above it can be seen that it is difficult to state with any confidence that road crashes cost African nations a specific and precise percentage of their annual GNP. In order to derive a crude estimate of costs therefore, a range of values has been used, based on an estimated sum of all GNPs of countries in Sub-Saharan Africa for the year 2000 (of US\$ 310 billion).

Table 6.1: Estimated cost of crashes 2000 (US\$ billion)

Percentage of GNP	Estimated cost of road crashes
1.0	3.1
1.5	4.65
2.0	6.2

A cautious estimate, based on the value used for many years of one percent of GNP, which is fairly close to the value derived recently in South Africa and Ethiopia, suggests a regional cost of about US\$ 3 billion. Higher estimates based on 1.5 to 2.0 % of GNP suggest \$4.65 and \$6.2 billion respectively.

Clearly, these are sums of money that the nations of Africa can ill-afford to lose every year.

7 LITERATURE REVIEW SUMMARY

The African road safety literature review is presented in Appendix C. The review has been organised by main sector with South African references presented at the end of each section. Two points should be highlighted with regard to the literature review:

- Apart from a few published papers, many of the references were conference papers or project reports, the latter largely unpublished but containing the most information on current operational practices.
- Road safety references identified were primarily limited to a few countries and sources. South Africa produced the vast majority of the literature pertaining to road safety and while references were obtained from several other countries, especially the Eastern and Southern African countries, very few references were found from Central or West Africa, despite the literature search being conducted in French as well as English. (Several West African road safety references were in fact excluded as they are now about 15 years old.)

Key findings from the literature review are summarised below but first the development initiatives deserve to be highlighted, as they often provided the funding for the road safety initiatives.

7.1 Development initiatives

While this may be the first study that reviews road safety in all of Sub-Saharan Africa, both bi-lateral and multi-lateral investment in road safety in Africa has been ongoing for about twenty years. The United Kingdom's Department for International Development (previously the Overseas Development Association) has funded the introduction of the computerised crash data system (MAAP) in several countries, the development of road safety educational

materials in Ghana, and has recently sponsored research into the under-reporting of road casualties in Zimbabwe and the effect of geometric design on crash rates in Tanzania and Zimbabwe. All DFID funded road improvement projects include road safety components and a police training project in Zimbabwe has included crash investigation and reporting.

Sweden's International Development Agency (SIDA) has also been a key donor of road safety projects in Africa and has regularly sponsored training courses in traffic safety management. The demand for training encouraged VTI to seek new ways of training and led to the introduction of Regional Traffic Safety Network (RetsNet), a pilot project in road safety technology transfer in Southern Africa.

Within the region, the Southern African Development Community (SADC) and the Southern African Transport and Communications Commission (SATTC) have targetted driver and vehicle safety through improved testing capabilities. The United Nation's Economic Commission for Africa (UNECA) has also sponsored research and organised three road safety conferences since 1984. The last of which provided many references for the literature review.

The World Bank has regularly addressed road safety issues in its road rehabilitation projects and its ongoing Sub-Saharan African Transport Programme has highlighted the safety needs of pedestrians and cyclists and produced design guidelines for vulnerable road user facilities. Hazardous locations for pedestrians are also being targetted in Zimbabwe and Burkino Faso and the level of awareness of pedestrian safety is being assessed.

The World Health Organisation is also helping raise awareness of the human burden of road crashes with its Road Injury Prevention Initiative in Africa. It is the only region such a programme is believed to be operating. The monitoring of trauma casualties in hospitals can complement police crash databases which are vulnerable to under-reporting.

The Global Road Safety Partnership, the recent World Bank led initiative promoting increased private sector and civil society participation in improving road safety, is also active in Africa and is looking to establish pilot projects in South Africa, Zambia and Ghana.

7.2 Road safety management

There has been a wide range of road safety management approaches attempted in Africa. National Road Safety Councils (NRSCs) and other similar bodies have existed for decades and have been restructured and updated in several countries, including Zambia and Uganda. South Africa abolished its NRSC in the early 1990's with a move back towards a Directorate of Road Safety. NRSCs appear to be more successful in delivering education and publicity campaigns but not national plans, remedial measures or targeted law enforcement programmes.

Whereas the multi-sectoral organisation, i.e. NRSCs, were intended to gain the participation of all sectors, they may have worked instead to dilute accountability. Action plans and work programmes were often developed by the NRSC or technical advisors, not by the people or the organisations expected to deliver much of the activities. Consequently large parts of the programmes are never implemented and alternative approaches have begun to be considered.

7.3 Funding

While road maintenance has in numerous instances benefited from user fees, road safety remains heavily dependent on government funding and donor assistance. In general revenues from fuel levies and other road related taxes have not been allocated to road safety improvements, even when allowed by Road Fund legislation. There are however, some promising exceptions such as the road safety fund in Botswana and there is evidence, e.g. Ghana, Ethiopia, and Zambia, that road funds will be invested in road safety activities in the near future.

7.4 Road safety partnerships and community participation

Partnerships between government, private sector and the community are now being actively promoted by the GRSP in several African countries (South Africa, Zambia, Ghana) and community based organisations are involved in road safety in South Africa and Uganda. It should be noted that many countries in Africa were seen to have a long standing involvement of the community representatives on their national road safety coordinating bodies.

7.5 Crash data system

While many African countries have computerised crash data systems, only a few make maximum use of the data. In most countries the data is not readily available or regularly shared. Few countries are able to accurately record crash locations. South Africa is the only country believed to be introducing a GIS based crash data system but other countries, including Zimbabwe and Botswana, are believed to monitor highway crash locations. Thus in many countries, road engineers are not able to identify where crashes are clustering nor can traffic police target their resources at the most dangerous locations.

7.6 Crash costing

Several countries have estimated the annual total cost of crashes to the country and a wide range of estimates has resulted. Not all cost estimates accommodated for under-reporting and the economic impact is still perceived in terms of the primary victim only and not the family. Crash costs also seem to be only used for publicity purposes and not for the economic justification of safety measures. The great shortage of information on the benefits of road improvements makes it difficult to determine cost benefit relationships for different measures.

7.7 Road safety engineering

Crash prevention involves proper planning and forethought. South Africa was the only country identified to have promoted traffic calming although Zimbabwe has pedestrian precincts and many countries use speed breakers (often demanded or even installed by local residents). Despite the ongoing large-scale donor financed rehabilitation projects in many African countries, safety audits appear to be used in only a few countries, including South Africa and Uganda. While geometric design standards have been updated in many countries, this may well increase the safety of motorised road users but is of less relevance to vulnerable road users.

Table 7.1 Model Traffic Safety Policy for Road Sector Development Programmes

The following guidelines shall apply to all major road rehabilitation projects:

1. **Road signs and markings** to be a basic/automatic component of any road rehabilitation project and this will involve updating and not the rehabilitation of existing signs and markings.
2. **Accident analysis** will be undertaken on available accident data. Road engineers will liaise with police and make effort to identify local accident pattern. Road engineers should also provide traffic police with strip maps of project road to facilitate future accident location referencing. Additional road accident monitoring (hospitals, community NGOs) should be encouraged to identify all injury road accidents occurring.
3. **Accident costs** are to be included in the economic appraisal of a road project.
4. **Safety Audits** will be conducted on all major road schemes and low cost remedial measures to be funded at **hazardous locations** identified by accident analyses or safety audits..
5. **Speed reduction measures** will be implemented at locations where rehabilitated roads transect villages. These locations should be identified by the safety audit.
6. **No pedestrian priority crossings** to be allowed where operating/posted speed is more than 50 km/hour. Pedestrian facilities are to be appropriate and not misleading.
7. **Education and publicity campaigns** will be conducted at all locations warranting speed reduction measures and schools within ½ kilometre of road.
8. For tender prequalifications, all roadwork contractors must undergo short (1-2 day) **training course on traffic management at roadworks**.
9. **Technical assistance to Highway patrols and first aid facilities** on major highways to be considered.
10. All **safety related reports and materials** will be provided to a road safety coordinator and will be shared with the other signees of this policy.

Crash reduction programmes are also relatively rare with few countries investing in cost effective remedial works. Road safety improvements have not been adequately included in road maintenance initiatives and the rehabilitated (and hence faster) roads may well be more liable to crashes. A Traffic Safety Policy was proposed for the Ethiopian Road Sector Development Programme to minimise these problems. A model policy is shown in Table 7.1 for consideration in other countries where road safety has lagged behind road maintenance improvements. Road safety also appears to have missed out on the donor financed institutional strengthening projects where the roads authority was reorganised and training programmes established with road safety issues being considered belatedly and peripherally.

7.8 Traffic regulations and law enforcement

While most countries have by now replaced their pre-independence traffic regulations with a more up to date set of regulations, the enforcement of the new regulations has been limited by the lack of resources. Traffic police remain lowly paid and often perform poorly. There have been different approaches to traffic law enforcement with countries such as Nigeria and Zambia recruiting civilians to assist with enforcing traffic regulations while others like Eritrea have the traffic police operating under the Land Transport Department. The general dissatisfaction with the traffic police is believed to contribute to the reluctance to invest in road safety measures.

7.9 Traffic safety education for children

Much focus has been given, by both national organisations and donors, on instilling safe road use habits in children. Most of the efforts have focused on the formal education system with the development of materials and the inclusion of traffic safety in the school curriculum. Progress has been made in Ghana and the DFID/TRL developed materials are now being expanded to Uganda.

Many children in Africa however, remain outside the formal school system. In Ethiopia, Radda Barnen (Swedish Save the Children) has included traffic safety lessons as part of their proposed syllabus for non-formal education. The Child to Child (CtC) approach, which involves promotes children teaching other children, is used to teach health lessons in several African countries (including Ethiopia, Zambia and Uganda). While there are several CtC road safety activity worksheets, none are believed to have been used in Africa.

7.10 Road safety publicity

Publicity efforts appear to be organised by the NRSC rather than the Ministry of Information or Health who would be more actively involved in public health campaigns. Few publicity campaigns appear to be documented, if conducted, and the evaluation of the effectiveness of the Arrive Alive campaign in South Africa was the only example of where a campaign's impact was evaluated. Other awareness campaigns appear to hold much potential for road safety in Africa, including the Adult Pedestrian Safety Project from South Africa and AIDS intervention programmes from Ethiopia (where transport workers have been targeted). Zimbabwe also conducts a quarterly publicity campaign which is private sector financed and uses advertising agencies.

7.11 Medical services

Trauma and epidemiological studies have documented the incidence of road crashes to be much higher than police statistics show but there are more pressing health problems in Africa. Concern over road crashes can be found with trauma and orthopaedic surgeons in main hospitals but not in Ministries of Health which must deal with childhood mortality, malaria, HIV and other more widespread medical problems.

7.12 Impaired road use

Alcohol and drugs are believed to contribute to many crashes but there is little associated data to corroborate this theory. Blood tests for alcohol are time consuming and rarely conducted.

South Africa has begun introducing the Drug Recognition methodology, developed in Los Angeles, which requires no medical tests. Such low-cost measures hold much potential for Africa and should be widely publicised.

7.13 Research

The recent review of road safety in five African countries (Assum, 1998) concluded that research was being conducted but only in a sporadic manner without any programme or coordination. While South Africa has a long established and well respected research organisation which has decades of experience in road safety research, other countries appear unable to maintain a road safety research programme.

DFID has been the leading donor sponsor of road safety research in Africa for the past 25 years with programmes in crash data systems, traffic safety education for children, HGV code, and bus safety. While there have been other research initiatives, like UNECA's research into pedestrian safety, most donor agencies do not fund road safety research.

7.14 Motor vehicle insurance

Almost all African countries require third party motor vehicle insurance coverage (except for Ethiopia and Eritrea) and there has been regional collaboration on introducing a Yellow Card scheme which guarantees insurance coverage while travelling in other countries. The extent to which motor vehicles are insured is not well documented but it is believed to be a major problem in many countries.

8 CONCLUSIONS AND RECOMMENDATIONS

The objective of this study was to analyse existing data and information on the road safety situation in Sub-Saharan Africa in order to identify the data gaps and priority needs. Based on the poor response received from an earlier survey distributed by the ECA, a shorter survey (restricted to crash data only) was sent to each of the 42 countries. Unfortunately, this too had a low response with less than 20 per cent providing the data requested. Accordingly, the data analysis was based on published sources such as the IRF statistics, and data identified in the literature review and project reports.

The calculations for the current estimate of the road fatalities in Sub-Saharan Africa are shown in Chapter 3. Between 68 and 82 thousand lives are estimated to be lost in road crashes in Africa in 2000. After adjusting for reporting definitions (+15%) and under-reporting (+25-+50%), this estimate is 40-65 per cent higher than that officially reported by the countries. The use of official road crash casualty statistics thus underestimates the true extent of the health burden, especially that of injuries, of which only a fraction are believed to be reported by the police.

Africa as a whole was found to have about 10 per cent of global road deaths in 1999 but contained only 4 per cent of global motor vehicles. Fatality rates (expressed as annual road deaths per 10,000 vehicles licensed) in a number of African countries are amongst the world's highest with some (Tanzania, Ethiopia, Uganda, Malawi and Ghana) in excess of 100. (In comparison, fatality rates in OECD countries are of the order of 1.5-4.5 road deaths per 10,000 licensed vehicles per annum).

The average growth in road deaths over the period 1985/86 to 1995/96 (excluding the two dominant countries of Nigeria and South Africa) was found to be over 40 per cent indicating the continued increase in road deaths over time. In comparison, road fatalities in Western Europe and North America fell over the same time period by about 20 per cent.

In the absence of a detailed sectoral review and few questionnaires completed by respondents, the amount of detailed information on road crash patterns available in the review was clearly limited. Nevertheless enough information was available to identify a number of key issues relating to different classes of road users.

An analysis of crash patterns showed that pedestrians are the largest category of road users involved in six out of the eight countries for which detailed information was available. In five of the countries, vulnerable road users (i.e. pedestrians, cyclists and motorcyclists) accounted for over 50 per cent of all persons killed (the equivalent value in USA, Germany and France for example is about 13 per cent). As might be expected, pedestrian involvement is even greater in urban areas. Thus in Addis Ababa for example over 85 per cent of both fatalities and casualties were pedestrians.

Results of the analysis of types of vehicles involved in crashes showed that the involvement rate of buses was, in some countries, almost four times that of their fleet share. Thus in Kenya, for example almost 30 per cent of all crashes involved a bus or minibus whilst the equivalent value in most Western countries is less than 2 per cent. Research on public transport safety undertaken by TRL has shown that public transport vehicles in Africa (and Asian) countries are frequently poorly maintained, often overloaded whilst the drivers themselves receive inadequate training. Public transport in many African cities is provided not only by the conventional bus but by 'paratransit' vehicles such as mammy wagons (converted trucks), and Matatu (converted vans etc). Such forms of public transport are poorly regulated and controlled with many operating illegally. These vehicles now have a reputation of being particularly dangerous.

It should be noted that the fatality range presented here (68-82 thousand) is less than half that previously predicted by the WHO (WHO, 1998). Even the higher WHO road fatality estimate was only one-tenth that predicted for HIV/AIDS and one-fifth that expected to be lost to malaria. Africa's road safety record is the worst in the world in terms of deaths on a per vehicle basis, but the region has other much greater causes of premature mortality. Road safety is unlikely to become a top medical or political priority in Africa and limited resources can be expected to be available for road safety improvements. Maximum use should be made of the limited resources and lessons should be shared. The recommendations listed below pertain to the perceived priority areas where needs are greatest and opportunities are being missed.

8.1 Sectoral Needs Analysis

As mentioned previously, this study was the first comprehensive review of road safety in Sub-Saharan Africa. It was primarily a desk exercise whereas other regional reviews of the Asia-pacific region, Eastern Europe and Latin America-Caribbean included country visits with local data collection a priority. In order to have a better understanding of the current constraints and capabilities within Africa, consideration should be given to the following:

- 1. A sectoral needs analysis should be undertaken by local counterparts in Sub-Saharan Africa. Standardised sector surveys should be developed by a coordinating organisation who will oversee the data collection and be responsible for the data analysis. This approach would provide a much better understanding of local needs and priorities which could be used for guiding future technical assistance. The recommended needs analysis should cover all key road safety related sectors including crash data systems, traffic law enforcement and regulations, road safety engineering, road safety coordination and funding, driver training and testing, vehicle testing, traffic safety education and publicity, motor insurance system, and medical services,*

8.2 Crash data

The situational analysis has been limited by the data available. The crash data survey response was very low and the summary presented here was collected from published reports and donor projects. This problem is not unique to Africa and plagued the previous regional reviews. The establishment of a regional centre for crash data is a frequent recommendation in cases such as this, where data is difficult to obtain. Intended to raise the status of crash data, this step is not believed to address the key problems, which include insufficient location details and lack of application. Priority instead should be given to the following:

1. *Crash location details should be standardised and monitored. Road authorities should provide traffic police with road maps, including strip maps from rehabilitation projects, to help document locations. The coding of locations and subsequent identification of hazardous locations should be one of the first objectives of a crash data system.*
2. *Joint training of police and engineers should improve the understanding of their roles and the development of crash data transferral procedures (from police to road authorities) should be included in any crash data system upgrading. The road authorities should be involved in the improvement of crash data reporting as they are expected to be the main users. The end objective is the application of crash data and not just its computerisation.*
3. *Examples of best practice would help others understand what is involved and how it can be achieved. Case studies of successful systems should be documented and shared with other countries.*
4. *Regional databases should be considered after the crash data has received more priority at the national and local level and the data quality has improved from local usage.*
5. *Investment in hospital reporting systems would produce better estimates of the number being injured in road crashes.*

8.3 Road Sector Development Programmes

The World Bank led Road Maintenance Initiative (RMI) in Africa resulted in countries adopting a coordinated approach to donor financing of road rehabilitation projects while increasing their self-financing capability through the use of a fuel levy. Road Fund Boards were established with private sector participation. Road safety appears to have been bypassed in this process with only one of the five Road Funds even mentioning safety measures (Ethiopia). While environmental impact assessments and relocation policies have been addressed, road safety concerns have too often been forgotten. This is partially due to a short term focus on maintenance needs by the highway authorities and a multi-sectoral approach to road safety which has focused on the linkages between the sectors instead of highlighting the individual sectoral responsibility. Accordingly, it is proposed that:

1. *All Road Sector Development Programmes should reconsider the need for incorporating a traffic safety policy which would ensure a minimum standard of road safety in all road projects. An example of a model traffic safety policy is shown in Table 7.1.*

8.4 Road safety engineering

As noted previously, many African countries are currently undertaking national road rehabilitation and maintenance programmes. This is a prime opportunity to review and improve the road safety situation of the national and regional highways. At present, road safety is assumed to be addressed through adherence to geometric design standards and few road safety audits are being conducted. Safety audits are needed as they consider the safety of all road users (including roadside dwellers).

1. *Safety audits should be a basic requirement of all major road rehabilitation projects with donor-financed projects containing demonstration audits and training programme on road safety audits.*

2. *Lessons learned from safety audits and any resulting changes should be centrally coordinated and shared with other countries in the region. This should be initiated by the donors who should request copies of all references and materials produced be shared with neighbouring countries.*
3. *Road safety engineering recommendations from national road safety plans should be integrated into the existing road authorities' 5 year plan and work programmes. Road safety engineering funding requirements should be integrated into road authorities planning and budgeting process.*
4. *Road safety engineering unit guidelines (suggested organisational structure, work programme, job descriptions, training programmes) should be developed as a key reference for the Institutional Strengthening projects which have often neglected safety in the past.*

8.5 Funding

Whereas road maintenance has benefited from the use of dedicated user charges, i.e. fuel levies, funding for road safety interventions has been limited primarily to general revenue and donor assistance. User charges for safety programmes need to also be considered. A safety surcharge on motor vehicle insurance premiums, has been considered by several countries and is believed to be in place in Mali. The advantages of this approach are limited by the low insurance compliance found in many countries. South Africa and a few other African countries have avoided this problem by collecting third party insurance through the fuel levy. A simple proposal - in terms of practical application but not necessarily political or public acceptability—would be to increase the fuel levy to provide a dedicated road safety source of funding. As the existing road funds have been designed with maintenance needs in mind and not road safety, this could involve an actual increase in the fuel levy, as opposed to a share of any existing road fund revenue.

1. *More priority should be given to financing road safety measures from user charges and that the most practical and appropriate measure would be to apply, (if not increase) fuel levy to pay for road safety interventions.*
2. *User charges should also be considered as means of paying for safety measures in other sectors, such as a safety levy on a driving license to pay for more or better trained driving examiners.*

8.6 Community Participation

Experience from both higher income countries as well as Africa has shown 'top-down' approaches to have limited effect and lack sustainability. Local participation is required to maintain political support as well as ensure the approach adopted, both in terms of problem analysis as well as remedial measure identification, is appropriate and compatible with local priorities.

1. *Community participation should be a basic component of any road safety programme, with involvement of both service organisations, NGOs, CBOs and the business community a priority. Local road safety initiatives should be incorporated in national road safety programmes with bottom-up efforts coinciding instead of following national level action.*
2. *Priority should be given to sharing the experience gained from community traffic safety programmes in motorised countries, including the USA, Australia, New Zealand and Norway.*
3. *Road rehabilitation projects should include publicity campaigns in villages adversely affected by road improvements with the local community involved in both the identification of the problem and the development of the remedial measures.*

8.7 Collaborations and Partnerships

As highlighted by the earlier review of WHO figures, there are many other causes of death (HIV/AIDS, malaria, etc) which will rightfully absorb the health sector's attention. The health

impact of road crashes will be overshadowed by other causes of death, especially at the national level. Whether it is injury prevention or AIDS related, partnerships with similar causes which require changes in behaviour and social responsibility should be sought. This wider approach has already begun in South Africa where CSIR have a safety education unit (instead of traffic safety). The WHO's recent initiative applies to all trauma victims with the Addis Ababa Emergency Medical Services Committee campaigning for increased trauma management skills and resources not only for road casualties but also for other trauma victims, such as from natural disasters such as earthquakes or floods.

1. *Collaborations should be promoted between road safety initiatives and other health organisations and advocacy groups, ie. HIV/AIDS, trauma services, AIDS, community policing, urban development. Traffic safety education should be designed to complement awareness programmes on HIV/AIDS, as the overwhelming scale of the latter must take priority.*

8.8 Monitoring and Evaluation

With limited resources available, it is easy to appreciate the need for proof of effectiveness and efficiency. Yet few evaluations were identified and the focus was on casualty reduction. The lack of complete and accurate crash data will handicap the use of casualty/crash reduction targets. Casualty reduction targets are also criticised for not adequately reflecting risk, as roads which are perceived to be dangerous may discourage use but this will not be reflected in the crash record. At this stage, skills and systems need to be introduced and implemented before any impacts will be seen and post-evaluations, which should be standard features of any project, should measure the change in capability, if not the impact on casualty levels.

1. *Performance targets should be identified and agreed within each sector as proxies for effectiveness. In many cases, casualty reduction targets will be premature given the uncertainty of the casualty data.*

8.9 Central Road Safety Reference System

The literature review confirmed two suspicions: information on road safety practices/situation could not be found for many African countries, and secondly, where information was found, it was often contained in unpublished project reports from donor assisted projects. The latter has a very limited circulation list and the information collected is not being used to its full potential (both inside and outside the country). Reports are often shared on an informal basis by interested parties trying to build on previous work, instead of "re-inventing the wheel". With the move towards a global approach to road safety as seen by the establishment of the GSRP, it is recommended that

1. *All donors agree to share their work and make project documents available to other donors and those organisations concerned with the promotion of road safety. Priority should be given to publishing recent project reports to allow greater dissemination and use whereas future reports should expect to be on general release.*
2. *There should be a central coordinating referral body identified for each country and one worldwide, preferably the GRSP. Inside a country, one organisation should have a copy of all road safety reports and within GRSP, all donor financed projects should provide abstracts if not copies of their reports in electronic format. Full copies of reports should be able to be downloaded from either donor websites or the GRSP website.*
3. *Consideration be given to converting the literature review contained in Technical Appendix C into a database with a standardised format so that additional references can be added. The African road safety literature database should be accessible via the internet (possibly GRSP or VTI's RETSNET) and updated on a regular basis.*

8.10 Vulnerable road user safety

As a general observation it can be said that pedestrians are the neglected road users throughout much of Africa. Relatively few pedestrian crossing facilities exist in most major cities such as foot bridges, under passes, signal controlled crossings etc. Features that assist pedestrian safety, for example, guard rails or central reservations are also infrequently used. Many African countries are also characterized by quite heavy pedestrian activity along rural roads as people move from village to village but most people are obliged to walk in the road itself as few sidewalks or even paths are made available for pedestrians.

It has been the general experience of high income countries to overlook the safety of vulnerable road users during motorisation. Greater priority has begun to be given to the vulnerable modes of cycling and walking in motorised countries in recent years but the focus at present in low income countries is on vehicle operating costs and the efficiency of motorised transport.

1. *Vulnerable road user safety should be a priority area, and pedestrian safety in particular. Training programmes should be undertaken to raise the awareness with engineers and police. Greater use should be made of CSIR's experience in pedestrian safety and consideration given to conducting regional training programme of CSIR's pedestrian facilities management and traffic calming courses. Donor funded road projects should specify vulnerable road user safety to be addressed.*
2. *Programmes and measures intended to promote vulnerable road user safety in motorised countries should be publicised in low income countries, i.e. speed reduction zones, traffic calming, home zones.*

8.11 Professional drivers

With such low motorisation in the region and the reliance of freight and passenger transport on road, the priority should be on reducing the crash risk of professional drivers and commercial vehicles. Results of the analysis of types of vehicles involved in crashes showed that the involvement rate of buses was, in some countries, almost four times that of their fleet share. Much needs to be done to improve public transport safety in most countries of Africa, including improved vehicle condition and maintenance, greater central or local government control and perhaps above all, improved driver behaviour. Research on public transport safety undertaken by TRL has shown that public transport vehicles in Africa (and Asian) countries are frequently poorly maintained, often overloaded whilst the drivers themselves receive inadequate training. Action has begun in several countries, including South Africa which has targeted minibus and taxi driving and Zimbabwe which is believed to require defensive driver training for all its public service vehicle drivers.

1. *Driver training and testing improvements and initiatives should target professional drivers. These should include extended on road tests with hazard perception checks, and defensive driver training. Refresher training should also be promoted along with close monitoring of drivers working conditions and crash involvement.*
2. *Driver training and risk management programmes should be proposed as a priority area for the newly established GRSP. Good practice code of risk management for fleet operators should be published.*

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Appendix A: Estimating Road Fatalities in Africa

1 THE CURRENT SITUATION

1.1 Estimating Road Deaths in Africa

Previous global or regional reviews of road deaths undertaken by TRL, the World Bank and others have acknowledged the problems associated with data reliability and under reporting. That said, traditional reliance has always been on the use of officially published statistics based on police reports. This study describes the results from these official statistics and then makes a “best” estimate of the real totals using the described correction techniques.

The officially reported number of persons killed in road crashes in the different countries (for the latest year available) are shown in Table 3.1. Data are available in most countries for years 1996 to 1998 but in a few such as Angola, Niger, Sudan and Liberia, the latest year was as far back as 1985. In some countries the reported deaths are very low, for example 22 in Chad, 43 in Gabon, 58 in Central African Republic. There may indeed be relatively few road deaths in these countries but it is much more likely that they are significantly under-reported.

Two countries alone account for almost fifty per cent of all reported deaths, namely South Africa and Nigeria. The South African value of over 9,000 appears to be consistent over time. For example, it was at about the same value in the mid 1980's. Nigeria on the other hand at 6,185 deaths is now showing a dramatic reduction from a high of over 9,200 just a few years ago. This recent figure must be treated with caution in that it is unlikely that a large amount of investment in road safety activities has taken place in recent years resulting in this dramatic reduction. Other countries also showing significant numbers of deaths include Ethiopia, Kenya, Uganda and Ghana. The 42 country total of 35,394 deaths and the individual national totals are significant underestimates of the true totals.

To improve the estimate of the current fatality situation in Africa, four additional correction steps need to be undertaken. These are:

5. Updating the fatality figure from the latest year available (which ranged from 1985 to 1998) to the year 2000.
6. Estimating for those countries where fatality data was not available at all.
7. Adjusting for the under-recording of fatalities by the police when the official database does not include all fatalities notified to the police.
8. Adjusting for the non-reporting of fatalities by the public, i.e. where the police are not notified of the incident.

This correction process was developed as part of a global review undertaken by TRL for the GRSP (Jacobs et al, 2000) and the results for each stage are described in turn below.

1.1.1 Updates to the Year 2000

Most countries had published road fatality data with the latest year available ranging from 1985 to 1998 and the first step involved updating this to the current year 2000. However after investigating time series data for seven of the major countries of Africa it was apparent that the use of an overall average growth rate would produce misleading predictions because the figures would be biased by some countries.

A more accurate model was developed by subdividing countries with time series data into three groups where group one contained those countries with large numbers of fatalities (Nigeria and South Africa), hence dominating the continent. Another group was formed from

countries with fewer road fatalities which included Ethiopia, Malawi, Tanzania and Zambia. A third group included those countries such as Kenya where trends were significantly different.

Regression equations were fitted to the total number of road fatalities in each group with linear regression used unless a strongly non-linear relationship was in evidence. The analyses suggested that the reported number of deaths in Sub Saharan Africa of 35265 for the latest available year could, by the use of regression equations applied to trend data, be adjusted to 39,700 for the year 2000.

1.1.2 Non-reporting by countries

Despite a review that included many sources, road fatality data could not be found at all for a number of countries in Sub Saharan Africa. The percentage of countries with no fatality data was about 25 per cent of the total which in population terms was about 20 per cent of the total population of all countries included in the study.

An attempt to represent these countries by motor vehicles would have been preferable but a significant number had no vehicle statistics available either. Accordingly, the number of reported road fatalities was adjusted upwards according to the ratio of population in countries with and without fatality data as follows.

$$\text{Population Adjustment} = \text{Reported Fatalities} \times \frac{\text{Total Population}}{\text{Population in countries with fatality data}}$$

This adjustment increased road fatalities from 39,700 to 47,650

1.1.3 Under-recording of fatalities

The problem of under-recording occurs when fatalities are reported to the police but are not included in the official database. Reported fatalities may be excluded from the official database because of reporting definitions and updating procedures.

As defined by the Convention of Road Traffic (Vienna, 1968), a road death is deemed to have occurred when a person injured dies within 30 days of the crash (and as a result of the crash). However, not all countries use a 30-day definition with some countries using 'on the spot', within 24 hours, 3 days, etc. Adjustment factors have been developed by various organisations to bring these countries not using the 30-day definition 'into line'. If this is not done, then a significant level of 'under-recording' will occur.

Adjustment factors identified included those recommended by the Economic Commission for Europe and the European Conference of Ministers of Transport (ECMT) and the United Nations. The more recent ECMT values indicate that if the definition 'on the spot' is used, then numbers recorded should be multiplied by a factor of 1.3.

In the most recent UK Casualty Report (1998), the ECMT values were applied to Turkey (30% increase for a one day reporting definition) and Korea (15% increase for a 3 day reporting period) (DETR, 1999). However, it was assumed that the ECMT values would not apply for all less motorised countries (LMCs). In Africa, a larger percentage of road crash fatalities can, unfortunately, be expected to die within the first day with the lack of medical facilities as well as the higher percentage of vulnerable road users involved.

Given the lack of information on the timing of LMC road crash deaths, the assumption was made to use half the ECMT values in this study. Thus those countries reporting road crash

fatalities occurring only within the first day of occurrence would have their figures increased by 15 per cent rather than 30 per cent.

A second assumption was made regarding the standardised death definitions in African countries; while many countries state the use of a 30 day definition, this could be interpreted to apply at the local level and for prosecution purposes. Road crash statistics are based on report forms that are often to be completed as soon as possible, i.e. '24 hour report form'. It can be very difficult to modify previously reported or submitted figures, especially where manual reporting systems are used which is the case in most African countries at the local level, where casualty reporting occurs. Accordingly, it was decided that regardless of the official definition, a one-day reporting time period would be assumed to apply for all of Africa and thus a 15% inflation factor was logically applied to all reported fatalities.

1.1.4 Non-reporting by general public

Almost all countries require road crashes to be reported to the police. However examples are shown in the report to the GRSP 'Estimating Global Fatalities' (Jacobs et al, 2000) of the levels of non-reporting identified in various countries throughout the developing world which can be considered relevant to Africa.

Evidence was found that of under-reporting of fatalities ranged from a minimum of 25 percent (Brazil) to as high as 350 per cent (Philippines) in LMCs. Accordingly, to adjust for the extent of non-reporting of fatalities, the conservative but realistic decision was made to use adjustment factors of 25-50 per cent for the countries of Africa.

The factors indicate a probable range of fatalities. Given all the uncertainty in the estimation, a range is much more appropriate than a supposedly precise figure and estimates will be shown for both factors.

1.1.5 Current fatality estimate for Sub-Saharan Africa

Based on the methodology described above, a realistic estimate of total road deaths for the 42 countries is between 68,500 and 82,200 for the year 2000. The calculations and totals are presented below.

Table A.1 Estimated road fatalities for the year 2000 with under-reporting (UR) adjustments

Step	ADJUSTMENT APPLIED	No.
1	Officially reported deaths	35,265
2	Adjusting to year 2000	39,700
3	Adjusting for countries not publishing road deaths	47,640
4	30 day adjustment (1.15)	54,800
5a	Under reporting adjustment (a) (minimum 1.25)	68,500
5b	Under reporting adjustment (b) (maximum 1.50)	82,200

Appendix B: Trends in Fatalities, Vehicles and Population

Country	Region	Fatalities			Motor vehicles			Population		
		1985/86	1995/96	Change	1985/85	1995/96	Change	1985/85	1995/96	Change
Benin	W	183	412	125%	15,000	36,820	145%	4,000	5,592	40%
Botswana	S	198	410	107%	41,486	82,223	98%	1,149	1,480	29%
Cameroon	W	1,123	840	-25%	121,500	162,000	33%	10,151	13,300	31%
Central African Rep.	C	85	58	-32%	1,862	2,147	15%	3,000	3,208	7%
Cote D'Ivoire	W	734	575	-22%	333,518	456,000	37%	10,650	16,150	52%
Ethiopia	E	1,258	1,702	35%	46,260	85,047	84%	44,743	58,470	31%
Ghana	W	705	987	40%	63,306	135,000	113%	14,045	19,200	37%
Kenya	E	1,832	2,617	43%	218,875	359,000	64%	20,384	25,480	25%
Malawi	E	533	1,382	159%	40,000	56,430	41%	7,380	11,640	58%
Nigeria	W	9,221	6,185	-33%				14,336	18,620	30%
Rwanda	C	387	483	25%	16,840	30,070	79%	103,147	131,000	27%
Senegal	W	483	791	64%	106,023	119,887	13%	6,236	9,300	49%
South Africa	S	9,343	9,848	5%	4,317,504	5,667,000	31%	6,770	8,572	27%
Swaziland	S	157	290	85%	42,115	63,461	51%	28,400	47,000	65%
Tanzania	E	1,062	1,809	70%	136,500	139,000	2%	681	938	38%
Togo	W	244	310	27%	79,770	216,000	171%	23,049	30,000	30%
Uganda	E	365	1,164	219%	41,020	130,785	219%	3,121	4,150	33%
Zambia	S	944	928	-2%	5,332	23,494	341%	13,972	19,848	42%
Zimbabwe	S	934	1,205	29%	282,309	355,000	26%	8,705	11,400	31%
TOTAL		29,791	31,996	7%	5,909,220	8,119,364	37%	323,919	435,348	34%
Total ex. South Africa & Nigeria		11,227	15,963	42%	5,772,720	7,980,364	38%	296,870	399,756	35%

Note; Trend data: Rwanda 1985-1994, Cameroon 1985-1993, Central African Republic 1987-95
Motor vehicles--Swaziland 1987-1996, Malawi 1990-1996

APPENDIX C: LITERATURE REVIEW

1 INTRODUCTION

This literature review of road safety in Africa has been organised by the main road safety sectors. South Africa's references were provided by TRL's local counterpart, the Centre for Scientific and Industrial Research (CSIR) in South Africa and they are included at the end of each section. This avoided the risk of the road safety work in South Africa overwhelming the rest of the region's efforts.

1.2 Sources

The first source for the literature review was the IRRD database which contains references from over 30 institutes and organisations from 25 countries and includes references in English, German, Spanish and French. IRRD is reported to receive approximately 10,000 references each year and is updated on a monthly basis. The literature review was limited to those references published in the past decade and it was decided not to include the 1989 Second African Road Safety Conference. A few key older reports were included, such as UNECA's 1989 Road Safety manual on Low Cost Engineering Countermeasures which remains a practical reference.

Articles were also identified from Conference Proceedings, including that of the 1997 Third African Road Safety Congress, TRL project files and from the personal libraries of colleagues.

2 ROAD SAFETY MANAGEMENT

One of the World Bank's Sub-Saharan Africa Transport Policy Program's Working Papers, Assum's Road Safety in Africa: Appraisal of Road Safety Initiatives in Five African Countries reviewed the institutional framework as well as the activities undertaken in each country. All five countries (Benin, Cote d'Ivoire, Kenya, Tanzania and Zimbabwe had national road safety coordinating bodies and while the roles and names may have differed, they shared the same main problems including funding and technical skill shortages which hindered implementation. The national road safety programmes were also summarised and the short and long term effects assessed (Assum, 1998).

The conditions for sustainable road safety work were described as: competence, political priority, funding, implementation, organisation, monitoring and evaluation, and time with political priority seen as the primary requirement which can facilitate the delivery of the other requirements.

This Working Paper concluded with a call for an African Road Safety Initiative, previously discussed at the Third African Road Safety Congress. Building on the success of the Road Maintenance Initiative which led to the introduction of road funds and private sector participation in road maintenance and rehabilitation programmes, an African Road Safety Initiative was recommended to use the same guiding principles: ownership, financing, responsibility, and management (Assum, 1998).

Examples of national approaches to road safety management, including several National Road Safety Councils, are summarised below.

2.1 National Road Safety Councils

Ghana

A National Road Safety Committee was established in 1974 under the Ministry of Transport and Communications. It was handicapped by the lack of a full-time executive although the situation should be changed now due to recent legislation which upgraded it to a National Road Safety Commission. A review of the activities undertaken by the previous Committee and the constraints it faced, including a lack of funding, were presented at the 1997 Third African Road Safety Congress (Kwayke et al, 1997).

The National Road Safety Commission Act 1999 should establish an independent Commission with its secretariat headquarters based in Accra and a regional road safety officer in each region to facilitate national coordination. The Commission will also benefit from an allocation from the Road Fund (approximately US\$300,000) for the year 2000 but this funding is dependent on the Commission developing an Action Plan that is accepted. Discussions have also begun about the introduction of a safety levy on insurance premiums (Ross, Nov.1999).

Nigeria

The road safety management structure in Nigeria was reviewed at a 3-day national workshop in 1997. This led to the establishment of a Federal Road Safety Commission (FRSC) in 1998, which has been described as operating a 3 tier system:

- First tier: youths in Road Safety Clubs in Schools
- Second tier: uniformed Road Marshalls and Commanders who are employed by the FRSC to help reduce road crashes.
- Third tier: volunteer Special Marshalls who do not have uniforms but are authorised to arrest and prosecute traffic offenders, give lectures, offer research services and advice (Yakusai, 1998).

In 1997, there were approximately 8,000 Special Marshalls operating nationwide and the FRSC described its approach as that of “precaution, education, subtle force and full enforcement”.

Senegal

The French Ministry for Cooperation and the French Ministry of Transport collaborated on the implementation of a road safety policy in West Africa. The French had already introduced a system of sharing information within the sub-region and were using pilot projects to demonstrate best practice. Starting with a national road safety seminar in 1993, Senegal was chosen for the road safety pilot project. Locally identified priorities included improving the crash data system, driver training, awareness raising activities, and vehicle inspection. The activities undertaken for each of these areas were described in a presentation (Bodon, 1997). After developing a standardised report form, a training programme in crash reporting procedures was undertaken in the 10 regional capitals. Two local computer analysts were trained in France and computerisation of crash data begun in 1994.

The effectiveness of the project was evaluated in 1997 at a follow-up seminar which was attended by Mali, Burkino Faso and Guinea. These countries subsequently adopted some of the initiatives in their own countries.

Botswana

Botswana’s National Road Safety Committee is arguably one of the most successful in Africa and is very successful in terms of publicity and education initiatives. Established in 1975, it

is supported by some 27 District Road Safety Committees which were introduced in 1983 and are who are usually headed by the District Commissioner.

Zimbabwe

Established in 1971, the Zimbabwe Traffic Safety Board had 6 offices in 5 towns and was financed by a grant from the Ministry of Transportation. In 1999, the ZTSB had a total staff of 45, including 25 road safety officers, of which 9 had been trained. ZTSB is very active in raising public awareness of road safety and it runs school visits, cycle training, safety weeks, publicity campaigns, etc.

Zambia

The present National Road Safety Council in Zambia was established by an Act of Parliament in December 1995 but it did not receive any funding until January 1997, when it was allocated a quarter of the amount its predecessor, the Roads and Road Traffic Board (RRTB) had received. Public sector representation was limited with the public sector representatives not even allowed to vote. The Council did not include a representative of the Ministry of Health but there was a representative from the Zambia Medical Council.

A 1997 World Bank funded study reviewed the road safety situation in Zambia, including the effectiveness of the National Road Safety Council and drafted a 2 year action plan (Aeron-Thomas, 2000). The World Bank has since allocated the National Road Safety Council US\$500,000 for institutional strengthening of the Council and is also financing the upgrading of the crash data system and training of traffic police.

Tanzania

Established in 1973, the National Road Safety Council of Tanzania was under the Prime Minister's Office until 1990 when it was transferred to the Minister for Home Affairs (the Ministry responsible for Road Traffic). The Council was established with both advisory and executive functions, the latter including the provision of road user education and information campaigns and the identification of hazardous locations. In 1986, four committees were created and the Traffic Police Commander was made the Secretary to the Council with his office functioning as the Secretariat. Regional and District Traffic Police Officers were to be the Secretaries of any Regional or District Road Safety Committees (Ministry of Works, 1996).

The Council has organised Road Safety Weeks at the national level but these were limited for various reasons including lack of funding, coordination and accountability, a top heavy council, and low priority allocated road safety by Traffic Police Commander. A new structure for the Council was proposed, including the transfer of responsibility to the Ministry of Works, with both the advantages and disadvantages reviewed (Ministry of Works, 1996). Funding sources were also proposed and included a US\$2 dollar levy per motor vehicle per annum.

At a recent seminar on Road Safety, a paper discussed the relevance of the Highway Safety Management System (SMS) for Tanzania. (Chobya, 1999). A SMS involves a systematic approach to identifying and addressing all opportunities to reduce highway crashes. The associated activities within the four E's (Engineering, Education, Enforcement, and Emergency Medical Services) were presented as was an example of a SMS database system.

Namibia

Namibia has recently adopted an integrated traffic safety management system after realising that its post independence (1989) approach to traffic safety, where responsibility was given to a secretariat in the Ministry of Works, Transport and Communication, was incapable of delivering adequate priority to traffic safety. It was appreciated that a holistic integrated systems approach was needed but that the traffic management systems approach adopted in South Africa was not suitable as it focused more on traffic management and a Traffic Safety Management System (TSMS) was needed for Namibia.

A core group was established from the various safety disciplines and focused on the issues identified as key:

- Traffic administration
- Road engineering
- Law enforcement
- Traffic safety education
- Logistical support

A process approach was adopted which reviewed each key issue area and its effects, relevant countermeasures and the recommended projects. The approach was described as being similar to that used in South Africa for the Traffic Management System but the focus was kept to traffic safety.

A draft Green Paper on traffic safety was produced in early 1997 for discussion purposes and a National Policy on Traffic Safety for Namibia was expected to be submitted to the National Road Safety Council at the end of 1997 for approval (Prosser and Pretorius, 1997). A TSMS Management committee was established to assist with the implementation of policy and four Work Groups (Engineering, Education, Law Enforcement, and Logistical Support) were also organised to develop work programmes. Priority areas included marketing and mass communication, alcohol and other drugs abuse, speed management, overloading problem, taxi's, driver training, seat belt wearing, a forgiving road environment and vulnerable road users (Prosser and Pretorius, 1997).

Uganda

The responsibilities of the National Road Safety Council in Uganda (as per the Traffic and Road Safety Act of 1998) are similar to that of Tanzania's as were the major constraints of funding and training. A 3 year Action Plan proposed for the country included the formation of a Road Safety Unit to provide technical support to the NRSC. The staff, office and administrative costs of such a unit were recommended to be met by a fixed annual budget (Phoenix, 2000).

2.2 South Africa Road Safety Management

South Africa abolished its NRSC in the early 1990s and has relied on the Directorate of Traffic Safety within the Department of Transport to coordinate road safety activities. Many papers and presentations have discussed road safety management as shown below with the national approach discussed before any regional case studies.

Road traffic management strategy

This paper provides a summarised broad description towards implementation of the nineteen chapters of road traffic management strategy and includes additional issues provided for in the chapter on "Road Traffic and Safety" in the White Paper on National Transport Policy of the national Department of Transport (Botha, G, Sep-97).

The Road Traffic Management Corporation

The current road traffic management picture in South Africa is very gloomy and innovative ways have to be found to get out of this perilous situation. To achieve the improvements required, the Road Traffic Management Corporation (RTMC) concept was developed. This paper discusses the objectives, functions, duties, financing etc of the Corporation (Van Tonder, H, Jul-99).

Towards a quantitative management approach to road traffic safety in South Africa

To successfully reduce the number of road traffic accidents in South Africa it is essential that limited resources be utilized as effectively and efficiently as possible. This requires that correct decisions be made on required resource levels and on the correct allocation of these resources to the different possible remedial measures. The objective of this paper is to describe how a quantitative management model could be constructed to assist road safety managers and investors in managing road safety in the most efficient way possible (Mollett, CJ, Jul-99).

Task and place of training colleges for traffic officials

The traffic occupations have a lack of specialised training and for this reason the traffic officers experience difficulty performing his task in a professional manner. This is also one of the reasons why this occupation enjoys less social esteem in this country. This paper a training system and its components are discussed (Janse van Nieuwenhuizen, J, Sep-99).

Safety south of the Sahara: lessons from abroad

It is found that whenever road traffic accident statistics are related to vehicle population, third world countries tend to have a significant worse accident statistics than those in first world countries. An obvious question arising is: Are there any lessons to be learned from the "safer" first world countries that could be of benefit to sub-Saharan Africa? This paper describes certain aspects of an investigation that was made into the road safety situation in a wide cross-section of countries in order to address the above question (Roebuck, CS, Sep-99).

Strategy 2000 - a end to carnage on South Africa's Roads

A discussion document towards a comprehensive road safety strategy, including detailed implementation tables of short to medium term actions (South Africa. Ministry of Transport, Apr-00).

Pedestrian management plans: the role of provinces and local authorities to reduce pedestrian casualties in South Africa

An audit of the current pedestrian safety situation in terms of the infrastructure provision, law enforcement and educational practices has been completed. This status quo forms the basis from which a pedestrian management plan will evolve and constitute the way forward (Makhanya, G, Sep-99).

Preparing traffic safety managers for the new millennium: an application of the outcomes based education model

A new national diploma has been developed to address Traffic Safety Management on an integrated basis. It is envisaged that traffic police and others in the field of traffic safety would be sufficiently equipped with the skills needed to enhance road safety management. The course was developed to be outcome based and the subjects were divided into modules which would address prior learning in terms of the National Qualifications Framework. (Van Vuuren, PEJ, Jul-99).

The implementation of a road safety management plan for Midrand Metropolitan Local Council

This paper describes the content of the Proposed Road Safety Management Plan for Midrand and the strategy adopted for its implementation. The town engineers and Traffic Departments of Midrand Metropolitan Local Council have joined forces with the South African Police Services stations in the Midrand area to form a Road Safety Working Group. This group has prepared a strategy for the implementation of a Road Safety Management Plan in support of the national drive to improve road safety issues in South Africa (Prinsloo, JJA, Jul-99).

Project Asiphephe - implementation

The Asiphephe "Let us be safe" road safety project is a long-term road safety program that is aimed at reducing road traffic accident fatalities by 50% by the end of the year 2000. This paper provides a short discussion of the project (Zulu, ME, Jul-99).

Asiphephe: from planning to implementation

In KwaZulu-Natal the Department of Transport has adopted a methodology based on the road safety strategy used so successfully in the Australian State of Victoria. The project, now termed Asiphephe (let us be safe) has moved from the planning phase to the implementation phase. This paper concentrates on the practical aspects of the implementation strategy and successes to date (Barker, RJ, Sep-99).

Implementing an integrated road traffic safety program in KwaZulu-Natal

The Australian state of Victoria's integrated road safety program has achieved large reductions in road trauma, massive economic savings to the community, substantial net revenue from fines and has lowered the costs of penalty management. This paper identifies the key elements of the Victorian model and elaborates the principles underlying the key elements of traffic law enforcement and mass media public awareness campaigns as they are being implemented in KwaZulu-Natal (Smith, RR, Sep-99).

Project Victoria in KwaZulu-Natal

The number of road accidents, with resultant injuries and deaths, on South African roads is unacceptably high. A project was implemented to improve the level of road traffic safety. This paper describes the procedures and methodology adopted by the authorities in implementing a sophisticated road traffic safety system into the broad spectrum of cultures and driving expertise found in KwaZulu-Natal (Barker, RJ, Sep-97).

The Balgowan traffic safety management project

The high accident and fatality rate on our roads is of national concern. A section of the N3 in the vicinity of Balgowan had a particularly poor accident record. This paper describes the approach adopted to investigate the accident problems at Balgowan. Remedial measures have been implemented and the project has been successful in reducing the number and severity of accidents on this section of the N3 (Deppe, EE, Sep-97).

Evaluation of road safety initiatives in KwaZulu-Natal between April 1997 and September 1999

The report evaluates the road safety initiatives implemented in KwaZulu-Natal since the inception of the Asiphephe Road Safety Programme. The programme is based on a customised version of the model successfully used in Victoria, Australia to reduce road casualties. The main issues covered in the report are: an overview of the Asiphephe Project, the approach and objectives of the evaluation process, the methodology followed, an evaluation of national and provincial structures to promote road traffic safety, an evaluation of the co-ordination of road safety programmes by the different agencies in KwaZulu-Natal and the evaluation of the effectiveness of the implementation of road safety measures within the key organisations responsible for road safety in KwaZulu-Natal. A number of recommendations are offered (Asiphephe Evaluation Panel, Oct-99).

Traffic management - a systems approach: Lower South Coast experiment - An opinion and awareness study in 1994

Attention was given to the opinions of the public with regard to traffic law enforcement, engineering measures, ambulance and rescue services. The awareness of DTS projects, the availability of traffic safety educational material in schools and the awareness of the Experiment itself were also investigated (Cronje, CPR J, Jun-96).

The Knysna micro traffic management plan - an opinion and awareness study

The objectives of this research were to determine the opinions of the public with regard to traffic law enforcement, traffic engineering measures, the environment and emergency services as well as their awareness of traffic safety educational projects and aids (Cronje, CPR, Nov-94).

KwaZulu road traffic safety study

This report provides information on road traffic collisions and casualties in KwaZulu, identifies problems in the collision reporting system and identifies short-, medium and long-term road traffic safety priorities. Recommendations are made towards improving the road traffic safety environment in KwaZulu (Van Niekerk, EC, Mar-92).

Lebowa road traffic safety study

The study provides the Lebowa Road Traffic Safety Committee with a proper data base on road traffic collisions and casualties. It also identifies the short, medium and long term road traffic aspects which should be attended to by the Committee. It consists of three sections: the trends in road traffic collisions and casualties since 1985 are analysed; a detailed analysis is done in respect of road traffic collisions and casualties during 1989 and hazardous road sections are identified and appropriate countermeasures are recommended (Ribbens, H, Dec-90).

Quality control: practical manual and implementation

The use of quality control for seven different models, namely seat belt wearing and alcohol drinking rates, speed, stop street and traffic signal infringements, visibility and following distances (Elphinstone, CD, Oct-90).

3 ROAD SAFETY FUNDING

Financing of road safety activities was one of the priority areas identified in the Second United Nations Transport and Communications Decade in Africa (UNTACDA II), covering the period 1991-2000 (ECA, 1997), yet few funding references were found. A general review of road safety financing was presented at the most recent African Road Safety Conference (Wetteland and Lundebye, 1997).

The two basic methods of self-financing and development aid financing were also summarised (Dhliwayo, 1997).

3.1 Self-financing

Government grants are the main source of funding for road safety activities (traffic policing, traffic signs and hospital treatment, etc.) but this is still found to be insufficient, especially in the areas outside road maintenance and construction (Assum 1997). As of 1997, Ghana's National Road Safety Council was receiving less than US\$10,000 a year from the government (Kwake et al, 1997) for its operation and publicity activities. Insufficient financing was found in other countries as well with Zimbabwe receiving less than one fourth its requested amount in 1997 (total of \$5.1 million instead of \$24 million) and the case of Zambia has already been described. In Uganda, the government spent US\$300 million on road rehabilitation in a recent

decade, but less than US\$ 0.05 per head per annum is spent on road safety publicity and education (Kwamusi, 1996).

In Zimbabwe, in addition to maintaining the Zimbabwe Traffic Safety Board and its activities, the government also used to subsidise defensive driving courses to make them more affordable for drivers. In Zambia, the government has occasionally provided the fuel for the mobile patrols conducted by the Honorary Road Marshalls, private citizens who are authorised to assist in traffic law enforcement (Ross, 1999).

3.2 Road funds

Of the five countries in Africa with road funds, none have a dedicated amount for road safety work and Ethiopia and Ghana are the only countries known where the Road Fund regulations specifically mention road safety measures. This has not resulted in increased road safety investment with the only road safety related activity being financed by the Road Fund so far to be the rehabilitation of traffic signs in Addis Ababa (TRL, 2000). The Road Fund Board in Ethiopia also rejected the idea of reserving 1-2 per cent of the Road Fund for road safety measures.

The Road Fund in Ghana has recently agreed to allocate US\$300,000 to the new National Road Safety Commission after it develops an acceptable action plan (Ross, Nov. 1999).

While the majority of road safety programmes are funded through bilateral or multi-lateral aid, self-financing is receiving more attention since the introduction of road funds. Botswana has had a levy (5 Pula per motor vehicle) paid annually by all users/owners of cars living in or visiting the country. Benin is also reported to contribute to the cost of road safety programmes from vehicle inspection fees.

User fees were proposed to become the long term financial source for road safety work in Tanzania, including:

- Third party insurance levy
- Annual road safety levy paid by vehicle owners
- Vehicle inspection fee
- Driving school levy
- Driving licence fee
- Portion of road fund
- Portion of traffic fines (Assum, 1998)

3.2.1 Traffic fines

A share of the traffic fines collected has been requested reserved for road safety in several countries, including Zimbabwe and Ethiopia. No country in Africa is believed to receive any part of the income received from traffic fines for safety measures (unlike Vietnam where traffic fines are allocated to road safety work). There has been progress with overloading fines being allocated to Road Funds in some countries (including Ethiopia although this has yet to be enforced). In Zimbabwe, the Ministry of Education has recently been allowed to keep school fees so there is a precedent for hypothecation of traffic fines. In Zambia, the Transport has requested a portion of the traffic fines imposed by road inspectors be allocated to road inspectors.

3.2.2 Motor vehicle insurance

The potential role of the insurance companies in sponsoring road safety was highlighted at the recent Third African Road Safety Congress with the example of Switzerland where 1 per cent of motor vehicle insurance premiums is collected by the Government and allocated to road

safety (Dhliwayo, 1997). South Africa and Benin are the only countries known in Africa where motor vehicle insurance premiums contribute regularly to road safety activities.

The National Road Safety Commission Act 1999 in Ghana includes provision for a levy on mandatory third party insurance and the Insurance Commissioner has agreed in principle to funding road safety activities from motor vehicle insurance premiums (Ross, Nov. 1999).

3.3 Donor Financed Projects

Donors have financed almost all major road safety programmes in Africa. This includes Botswana, Kenya, Uganda, Ethiopia, Togo, Malawi, and Ghana. The example of Togo is presented here where a World Bank financed road safety project (1991-95) team included members of the German Road Safety Council and sought the close involvement of Togolese experts. Some of the outputs included:

1. A restructuring and updating of the Togolese road traffic legislation and the production of a rulebook on traffic regulations, licensing requirements for vehicles, licensing requirements for persons, and traffic offences.
2. Standardised vehicle inspection forms.
3. Development of a six month driving instructor training course which concludes with an exam consisting of a written and oral part, a demonstration lesson and a practical demonstration lesson in the vehicle. Practical training was emphasised and the course included an introduction to first aid provided by the Togolese Red Cross (Toure, 1997).

3.3.1 South Africa Funding of Road Safety

No specific references on funding of road safety in South Africa were identified. As discussed in the next section, South Africa currently funds both compensation and prevention activities from motor vehicle insurance.

4 MOTOR VEHICLE INSURANCE

Almost all countries in Africa are believed to have mandatory third party insurance requirements for motor vehicles. Eritrea and Ethiopia are two exceptions although in Ethiopia, a Working Committee has recently been formed to reconsider introducing compulsory third party insurance.

Harmonisation of regional motor vehicle insurance legislation has been a priority for both the Southern African Development Corporation (SADC) and the Common Market of East and Southern Africa (COMESA). In 1999, a SADC/COMESA Regional Workshop on Third Party Motor Vehicle Insurance (Yellow Card Scheme) discussed the Model Motor Vehicle Insurance Act with the following recommendations:

1. Mandatory insurance for liability to third parties
2. For property damage, third party liability insurance equal to US\$10,000 per person, with a maximum of US\$100,000 per collision.
3. For bodily injury, third party liability insurance to be a minimum equal to US\$10,000.
4. Third party liability insurance coverage for passengers for reward is limited to US\$10,000 per person, with a maximum of \$100,000 per incident.
5. No coverage for guest passengers, i.e. non fee-paying passengers (except for medical expenses as #7).
6. No cover for employees, assuming the existence of a Workman's Act.
7. Mandatory first party medical expenses cover up to US\$150 per occupant of vehicle
8. Annual adjustments of the above amounts to account for inflation, currency depreciation or economic conditions.
9. Government vehicles are to be insured to be deemed to be insured by the government (this allows governments the choice of self-insurance).

10. Insurers may require a roadworthiness inspection as a condition of undertaking insurance.
11. Financial sanctions against claimants who violate certain law are imposed on two classes of law violators uninsured claimants and claimants not wearing seat belts.
12. Recognition and membership in the Yellow Card Scheme for insuring foreign motorists. (SADC/COMESA, 1999)

Three subjects considered for harmonisation which were not included in the Model Act were:

1. No-fault systems of compensation
2. Fuel Levy Systems
3. Compensation for Victims of Unidentified (Hit and Run) Motorists

At present, fault based systems dominate the insurance industry in Africa and there was little local interest in converting to a no-fault system. Eritrea and Ethiopia are believed to be the only COMESA members which require the driver to prove he is not at fault (COMESA, 1998). The Yellow Card scheme does include mandatory medical insurance coverage (#7) without proof of fault and Botswana allows for the funeral expenses for child fatalities (14 years or younger).

Five SADC countries fund mandatory third party bodily injury compensation from their fuel levy. This system ensures that all motorists are insured. Cost is related to risk with vehicle kilometres travelled and fuel consumption the proxy for risk. The main problem encountered with this system is that compensation claims have tended to exceed revenues and governments do not want to increase fuel levies. In 1998, Botswana responded to this problem by introducing a ceiling on compensation of 1 million pula.

Hit and run victims are guaranteed compensation in only a few African countries. In Zimbabwe, a fund for victims of hit and run and uninsured vehicles is paid for by a levy on insurers. Uganda introduced a similar fund in 1988 but it lasted less than three years. Hit and run victims are eligible for compensation in Swaziland but with a much lower ceiling. In four countries, fuel levy funds finance compensation to victims of unidentified vehicles. Standard requirements include the crash being reported to the police (SADC/COMESA, 1999).

The COMESA Yellow Card Compendium was produced in 1998 and provides much information on the insurance system within 17 countries. The scheme included medical expenses for drivers and passengers and in the event of a collision, the only requirement (re compensation) is that it is reported to the police (COMESA, 1998).

While the insurance industry has collaborated on the Yellow Card Scheme, there is not believed to be a similar organisation to the Loss Prevention Association in India or the Insurance Association for Highway Safety in the United States for promoting road safety awareness among the general public.

4.1 Motor Vehicle Insurance in South Africa

Mandatory third party insurance was introduced in South Africa in 1942 and in 1986 the Motor Vehicle Accidents Fund Act of 1986 authorised the system where third party insurance was funded through a fuel levy. The current system was revised under the Road Accident Fund Act of 1996. (Road Accident Fund, 1997).

Many government inquiries have been undertaken into the motor vehicle insurance system with draft white papers circulated for public discussion (Director-General Transport 1996, 1997). The White Paper on the Road Accident Fund, published in early 1998, reviewed the weaknesses of the current system and the different options, including limiting compensation, and introducing no-fault insurance. (Government Gazette, 1998).

5 COMMUNITY PARTICIPATION

Community participation can be found as far back as some of the early establishment of African NRSCs. Botswana has had service clubs on its NRSC since its formation in 1975 and Tanzania's NRSC (1977) included a representative from an organisation for accident victims (Assum, 1998). In Zambia, the NRSC (see table above) is comprised primarily of non-government organisations and includes the Passenger, Pedestrian and Cyclist Association.

As donor-assisted and nationally led, i.e. top-down, road safety programmes prove difficult to sustain, there is renewed appreciation of the need for community support, especially at the local level. At the Third African Road Safety Congress (1997), there were three related presentations, two on community road safety (Kwamasi Paul, de Beer, 1997) and one reviewing the role of the road safety NGOs and the World Bank's long standing policy of collaborating with NGOs (Lundebye and Ellevset, 1997). The Norwegian Society for Road Safety (NRSS), the umbrella organisation for all voluntary road safety work in Norway, was highlighted, including its functions, organisational structure and funding sources (over half from government and the rest from insurance companies, annual fees of members and Children Traffic Club membership fees). The Bangladesh experience was also summarised; a 1996 seminar on the Role of NGOs in Road Safety led to the proposal for NGO pilot projects in traffic safety education in schools, information/public awareness campaigns, transport operators, rehabilitation centres and legal aspects.

5.1.1 Uganda

In 1996, Uganda, a sociologist and an ex police officer started the Uganda Road Safety Network (URSN) with the following objectives:

- To raise the level of safety awareness among road users to change the unfavourable road situation
- To fill the Road Safety Management Gap in light of increasing road accident rates.
- To bridge the gap existing between Road users on one hand, and Policy Makers on Road Safety agencies on the other by providing a forum for greater road user participation in accident reduction
- To cooperate with road safety agencies using a complimentary approach in execution of relevant safety programmes
- To involve the local community into more participation in road safety issues for road accident reduction.
- To develop a local pressure group to champion and lobby for road safety interests and causes (Kwamasi Paul, June 1996).

The Network has developed a project proposal which includes the activities of:

1. Road safety consultancy providing institutional strengthening of road safety related organisations.
2. Training services: senior management, training of trainers, defensive driving, etc.
3. School safety schemes where the URSN will provide the safety educators with the necessary logistics and materials.
4. Road safety publicity including media and billboards, drama and road safety clubs, essay competitions, exhibitions and agricultural shows, film shows and seminars.
5. Post accident rescue service; a 24 hour ambulance rescue service is intended for the second year of the project.

The proposal also included the management structure of the project, the work plan, and how the project would be monitored and evaluated. The constitution of the Network was also provided (Kwamasi Paul, June 1996).

The same author presented a paper at a Road Safety Seminar in Uganda (Kwamasi Paul, July 1996) which provided more details on the proposed programme, including performance targets. By the end of 1997, the following was to be achieved in the pilot area:

1. reduce the rate of accidents by 25%,
2. provide at least 3 lesson per term to school children,
3. heighten publicity to reach at least 60% of road users response,
4. establish Road Safety Clubs in all schools
5. conduct seminars for community development organisations

In addition, the programme was to have begun identifying black spots on the road network and providing road safety information to policy makers on a bi-monthly basis (Kwamasi Paul, July 1996).

Apart from Uganda, however, the only references found dedicated to community participation in road safety were from CSIR/South Africa (Vermaak, de Beers, ROBOT). In Ethiopia, Radda Barnen's draft Alternative Basic Education syllabus for non-formal education included traffic safety lessons and this initiative is discussed in Chapter 12 Traffic Safety Education for Children.

5.2 Community Safety in South Africa

South Africa has benefited from the presence of Drive Alive, an active road victims' campaign group. Drive Alive has been instrumental in raising awareness of victims' needs and in 1998, it organised an interprofessional conference on the impact of road death and injury conducted seminars on the Impact of Road. Drive Alive is believed to be the only African (associate) member of the European Federation of Road Traffic Victims.

Drive Alive has recently established a partnership with Soul City, a health based NGO in South Africa, and together, they have produced a 26 part children's television serial based on Trauma. Each episode concludes with a discussion among children and there is a book on each episode which will be distributed to every grade 7 pupil in the country. The book also comes with a reflective tie-on strip which children are encouraged to wear while walking on the road. Drive Alive and Soul City are also campaigning to have reflective material become a required part of school uniforms.

Other good examples of community support for road safety in South Africa include:

Women for Traffic Safety

In 1991, the Directorate of Traffic Safety and the Women's Bureau of South Africa collaborated on a "Women for Traffic Safety" project. The project began with a training seminar for six "ambassadors", a competition in a popular woman's magazine, and launches in two cities. A project kit was produced which included a 20 minute video produced in both Afrikaans and English, a pamphlet on road safety, a traffic safety award leaflet, and the outline of a speech which could be used by other women to promote traffic safety (Robot, January/February 1993).

Eye Sense for your License

In 1999, the South African Optometrist Association (SASO) began the campaign "Eye Sense for your License" which provided free vision screenings for the renewal of drivers' licenses. A special watermarked and numbered certificate was given with each screening, which is accepted by the traffic departments for proof that vision has been retested. This initiative reduced waiting time, allowed more regular and frequent eye checks and also helped multi-focal wearers who would have fail the eye sight checks given by the traffic department due to their equipment limitations (Robot, Winter 1999).

As mentioned previously, CSIR has also been actively promoting community safety and has published the two following papers on community safety projects underway in South Africa.

Community-driven traffic safety: the "bottom-up" approach

This paper serves to report on the development and progress to date of the Eastern Gauteng Traffic Safety Programme, a project pioneered by the Eastern Gauteng Services Council. Working with communities is a continuous learning process. This paper also serves to share years of experience in community-driven traffic safety, the "bottom-up" approach, with the traffic safety community (Salida, EE, Jul-99).

Participatory Road Safety Educational Technologies (PET): a community-driven approach

This paper looks at the various participatory educational technologies (PET), developed by the CSIR, in a framework of a community-driven process. The process and technologies are presented and discussed as they were implemented in the community of Mamelodi. PET is an alternative methodology of teaching high school students about traffic safety. It is a dialogical, problem-posing approach that leads to action for change. The learning process of three high schools in Pretoria, in terms of PET, is discussed (Vermaak, L, Sep-99).

5.3 Private sector sponsorship

The Global Road Safety Partnership (GRSP) have identified Ghana, South Africa and Zambia as 3 of its 15 focus countries for demonstrating public private partnerships in road safety.

Since 1997, the petroleum industry in Ghana has been investing in defensive driver training for industry trainers. Shell Ghana introduced the programme originally for its contractors after they were involved in 19 fatalities in 1997. Shell Ghana established a facility for defensive driver training and vehicle inspection (with the country's only brake roller tester). A comprehensive eye test is also conducted at the facility. Mobil is now also participating in the programme and the name has been changed from Shell Facility to Petroleum Road Transport Safety Limited. Over 800 drivers have now been tested and there were no road fatalities reported by any Shell transporter in 1999. There are also plans to expand the service to other petrol companies and transport firms as well as to other locations in the country.

Ghana also benefits from the presence of the Emerging Leaders for Development (ELD), an organisation which has included road safety among its social commitment for several years. The lollipop safety scheme, whereby children were assisted at pedestrian crossings, was initiated by an ELD member who also arranged private sector funding (Winnet, 2000).

In Botswana, a joint venture in Botswana has led to the first children's traffic school being built in Gaborone. Sponsorship was provided by Shell Oil Botswana, UNICEF, Asphalt Botswana and other companies while subsequent children's traffic safety schools are reported to be provided for in the National Development Plan (Department of Road Transport and Safety, 1997).

In Harare, the private sector is sponsoring a pilot programme targeting child pedestrian safety at two schools. These schools were selected on the basis of their poor crash record. The new students in the first two years are given reflective jackets to improve their conspicuity to drivers. They are also given lessons in safe road use and their parents are given similar training, along with the proper care and maintenance of the reflective jacket.

5.3.1 South Africa

The Road Accident Fund has been the main sponsor of South Africa's *Arrive Alive* campaign. Robot, the South African Department of Transport road safety quarterly magazine reported other private sector sponsorship for the December 1998/January 1999 holiday period to include:

- Shell/Fleetwatch: Poster-sized stickers were distributed to transport fleets.
- Shell Oil: Posters on road safety were displayed at service stations
- Motor Industry Federation: The Life and Limb print campaign appeared in national newspapers and offered free vehicle checks over the holiday season.
- Blood Transfusion Services (BTS): The BTS Holiday campaign focussed on road deaths and posters carried both the BTS and *Arrive Alive* logo's.
- Vodacom and MTN: Messages appeared on cell phones and pre-recorded messages were played on voice-mail retrieval.
- Eskom: *Arrive Alive* posters, license and bumper stickers were printed for the fleet.
- National print media: The Minister negotiated free advertising in several national newspapers.
- South African Breweries: Don't drink and drive TV and radio advertising was produced. Billboards in support of *Arrive Alive* were also erected. R1.5 million was promised to *Arrive Alive*.
- Gilbeys: Radio Advertising and free transport from office parties to home (Robot, Autumn 1999).

6 CRASH DATA SYSTEM

Crash data has been a priority in many countries and on many projects as a good database is a prerequisite for a scientific and analytical approach to improving road safety. SARTTO identified the improvement of the quality of crash data among its member countries as a basic aim. At the Thirteenth SARTTO meeting in Swaziland in 1991, a TRL presentation proposed that its program Microcomputer Accident Analysis Package (MAAP) be adopted as the SARTTO standard. At the time, MAAP was about to be used in four countries, thus making it the most widespread crash data program in Africa (Baguley, 1991). The presentation included the background of the development of MAAP and a summary of some of the other locations where it was operating.

MAAP was introduced to Africa in 1986 when it was piloted in Botswana for one year before being adopted as the national standard. Crash location details were given much priority and a standardised system introduced with major towns using both a system of node numbers and grid coordinates. Kilometre posts were installed along all major interurban roads which enabled crashes to be identified by the road number, nearest kilometre post and direction to the nearest feature. With the introduction of MAAP, Botswana began identifying its crash patterns and worst locations and developing a programme of appropriate remedial measures (Baguley, 1991).

MAAP continued to expand in the 1990s and was introduced in Ghana in 1989 and Zimbabwe (1991). It is now used in a total of six African countries including Botswana, Ghana, Tanzania (Dar es Salaam only), Uganda (pilot project), Zimbabwe, Swaziland and it has been piloted in Malawi. A paper at the Third African Road Safety Congress in 1997 described the implementation and use of MAAP in these six countries. The topics covered included the background to each installation and the training undertaken, office procedures adopted, data use, institutional involvement, technical support and future developments. Findings included MAAP being more easily introduced when it was able to replace rather than merge with an existing data collection system and the conclusion that further technical support would be needed to these countries in the medium term at least (Gorell, 1997). The crash report forms are customised to local specifications and the paper included a comparison of the record formats used in each country. Zimbabwe and Swaziland had 53 fields on their report forms while Tanzania and Ghana collected 95 and 94 respectively.

Botswana produces an annual road traffic safety report to publicise the magnitude of its road crash problem. The most recent report (1997) covered the following topics:

- Road safety costs
- Botswana's Road traffic accident problem
- Pedestrian accidents
- Child casualty problem
- Driver training
- Vehicle examination
- Attitude of road users
- Who?
- Where?
- When?
- Alcohol (Department of Road Transport and Safety)

Manual road crash reporting systems were still in use in Benin and the Ivory Coast a few years back (Assum, 1998).

All countries are believed to use police data as the source of road casualty statistics although under-reporting of road casualties is openly acknowledged in many countries (Assum, 1997, Aeron-Thomas, 2000). The extent of fatality under-reporting was considered in the recent TRL report "Estimating Global Road Fatalities" which sought to produce a practical estimate of the number of lives currently being lost to road crashes (TRL, 2000). Traditional engineering approaches had used police data, while acknowledging it to be incomplete, while the WHO had recently estimated road fatalities on a regional basis using a complex system of models and predictions. WHO had predicted as high as 170,000 lives would be lost in road crashes in Africa in 1998, a figure several times that being reported in official statistics (WHO, 1999).

6.1 South Africa Crash Data Systems and Analysis

South Africa is currently updating its crash data system with the introduction of the National Traffic Information System (NATIS) and TRAFMAN. Some recent crash data studies in South Africa were identified as:

Implementation of the national accident register in Gauteng Province

The paper provides an overview of the planning and implementation phases of the National Accident Register in Gauteng. It also highlights some of the problems encountered in the process (Arran, KM, Jul-99).

Potgieter street traffic safety project

Potgieter street has acquired a reputation as being a route known for heavy vehicle related accidents involving multiple passenger vehicles. Public outcries urged the involved authorities to investigate the extent of the traffic safety of Potgieter Street. The project team had the task of identifying the potential hazardous conditions in the street, of establishing the cause of accidents that occurred in the past years on this route and addressing these problems with solutions. This paper is a short discussion of the work and findings of the project team Van Schalkwyk, I, Sep-99).

National speed response programme: A summary of the contributing factors to fatal collisions from 1 January 1994 to 31 December 1994

The aim of the National Speed Response Programme is to identify contributing factors to fatal road traffic collisions. The purpose of this report is to determine the factors that contributed to 3050 fatal collisions investigated from 1 January 1994 to 31 December 1994 (Mynhardt, DC, Apr-95).

Traffic accidents at intersections in Cape Town

There is a growing awareness of the economic consequences of road collisions and there is a need to reduce collisions through road improvements. Urban intersections can be particularly

hazardous locations within a road network. The objectives of this study were to investigate techniques for the study of collisions and to determine the effect of intersection control type on different collision types. The most important finding of the study was that the total number of collisions occurring at an intersection is not much affected by the control type and that there is not truth in the popular ideas that collisions are higher at stop controlled intersections than at signals. The study was restricted to intersections in Cape Town. Available data restricted the study to stop and signal controlled intersections only. A combination of regression and matched group analysis was used with hypothesis testing for statistical significance (Lee-Jones, KC, Jun-94).

Methods to obtain, analyse and present collision data

This report describes a pilot study conducted to assess the need for a course on: Methods to obtain, analyse and use collision data (De Beer, EJH, May-93).

7 ROAD SAFETY ENGINEERING

The importance of safe road environment has been a consistent theme among donor agencies and international organisations. Road safety engineering is traditionally divided into the proactive crash preventive measures, which reduce the risk of crashes and reactive crash reduction measures, which address existing problem areas.

7.1 Crash prevention (planning and design)

While not restricted to Africa, the then Overseas Development Administration (ODA) funded manual “Towards Safer Roads in Developing Countries; A Guide for Planners and Engineers”, is still a key reference for both policy makers and engineers. Each chapter included a short introduction which was then followed by 2 page sections on key planning or design features. A standardised layout was used with examples of both bad and good practice provided. The table of contents is shown below in Table 7.1.

Table 7.1 Towards Safer Roads in Developing Countries Table of Contents

Part I Introduction and Background
Ch. 1 Road safety problems in developing countries
Ch. 2 Institutional Framework
Part II Accident Prevention through better planning & design of roads
Ch. 3 Planning road networks
Ch. 4 Designing for safety
Part III Highway Operation and Accident Countermeasures
Ch. 5 Operating the road network for safety
Ch. 6 Countermeasures at hazardous locations
Part III Road Safety Checklists
Ch. 7 Road Safety Checklists

The Road Safety Checklists included were for land-use/physical plans, network planning, highway design, and countermeasures related activities. A checklist for a site visit to hazardous locations was provided in a separate appendix. Towards Safer Roads has served as the basis of several training courses and a slidepack is also available (TRRL, 1991).

DFID has invested in follow-up research in the cost and safety efficient design (CASE) of rural roads in developing countries. CASE is investigating the relationship between design, operating characteristics and crash rates with the objective of identifying where safety and cost can be optimised. Four of the five countries participating in the study are in Africa (Botswana, Zimbabwe, Tanzania, and Malawi).

Design Guides

Faced with the problem of roads being built to different standards, often to the road designer's national standard, many countries have revised their Geometric Design Standards in the last few years. The first comprehensive geometric design manual for roads for the Ethiopian Roads Authority was recently produced. Safety was given much consideration as indicated by the preface...

“ the authors are of the opinion that safety should receive a strong emphasis, and this factor is considered repeatedly in this manual. A highway designer must strive to eliminate hazardous conditions, or dangerous unexpected situations for the driver to face. In a safe design, the designer should think in terms of a driver using the road in less than ideal circumstances. Consider a wet pavement, nighttime use, where the driver is using the road for the first time, and perhaps he has had a few drinks. If this combination of elements results in an unsafe environment for the driver, it can be considered that the design is insufficient” (Ethiopian Roads Authority, 1999).

In Tanzania, a safety audit was conducted on the Mikumi-Kidatu road, a gravel road which was to be upgraded to bitumen standard. As with many highways, narrow bridges located on the highway and especially at sharp corners, were a safety problem. The design of the upgraded road included the added safety features of

- pedestrian walkways to the bridges
- speed humps and road signs (including reflective warning signs) at approaches to narrow bridges
- guard rails at bridges and where large drops (above 3 metres) occur
- bus bays and parking areas
- straightened approach to Ruaha Bridge (Kiza and Kayoza, 1997).

A recent World Bank funded project in Uganda was to revise the chapters of the Road Design Manual, which pertained to geometric design, junctions and road furniture (including traffic signs and road markings). Key design features which required priority attention included the need for a wide shoulder (2 m) on Class 1 rural roads. The study proposed the following design elements for urban arterial roads:

- Dual carriageway, with a kerbed median and kerb and channel at the outer edge.
- Each carriageway 8.0 m width, comprised of 4.5 m lane (including a 1.0 m shoulder for cyclists), and a 3.5 m auxiliary lane.
- Pavement markings at 3.5 m from the median
- Kerbed median minimum width 1.8m, desirable width 3.0m.
- Footpath minimum width 2.0m, typically 3.0m

A recent doctoral thesis has resulted in an extensive analysis of the crash situation within Addis Ababa and on an adjoining intercity road. (Berhanu, 2000) The role of road and traffic factors was compared on the crash rates of urban and rural locations. Models were developed which related traffic accident frequencies with road and traffic explanatory variables. These predictive models were recommended for use in assessing the potential safety performance of various geometric design and traffic management alternatives as well as improving the traffic safety training of engineers.

Vulnerable Road User safety

The 1997 UNECA Study on the Improvement of Pedestrian and Child Safety in Urban Areas also emphasised reducing the crash risk through better planning of cities and the provision of good transport infrastructure and facilities. Key planning guidelines recommended included:

- Urban planners should consider a functional classification for the road network. More use of the cul-de-sacs grid system in residential areas.

- Activities that are expected to attract heavy pedestrian traffic should be located away from the main roads.
- Urban planners should consider land use plans that minimises the travelling distances, use of cars, thus encouraging more pedestrian walking rather than vehicle traffic.
- Urban planners should consider in their city planning the possibilities of segregating the movement of pedestrians from that of vehicles.
- City traffic restraint should be practices such as heavy parking fees, restricted parking areas, etc. (UNECA, 1997)

The Study also included recommendations for several other areas, including road and traffic engineering measures.

Road safety has been a main focus within the urban transport component of the World Bank's Sub Saharan African Transport programme. Focusing on pedestrian safety, the safety objectives include:

1. Assess the knowledge among pedestrians as to accident risk and identify required pedestrian behaviour;
2. Examine the effect of specific safety measures on pedestrian behaviour, drivers behaviour and accident risk;
3. Raise the awareness of policy makers and road safety officials towards pedestrian safety;
4. Select particularly dangerous urban areas in terms of road safety records to design and implement on a pilot basis, Pedestrian Safety Guidelines, conducting to a Pedestrian Safety Policy including, when appropriate, the redesign of the urban road network (SSATP, 1997)

Draft guidelines for planning and improving facilities for pedestrians and cyclists have recently been prepared for SSATP. The guidelines are based on pilot projects conducted in four African cities (Dar es Salaam and Morogoro in Tanzania and Nairobi and Eldoret in Kenya) which show, according to the author, that traffic calming can largely eliminate the risk of serious road injuries to pedestrians and cyclists. Self-enforcing, i.e. physical measures, are believed necessary for improving road safety (de Langen, 1999).

DFID has also invested in research aimed at reducing pedestrian crashes through improved road design and management. A recent project analysed pedestrian crashes in five countries including Ghana and Zimbabwe (WS Atkins, 1998). In addition to collecting crash data, traffic surveys, pedestrian questionnaires (including pedestrian casualties as well as pedestrian control group) and road inventories were undertaken to improve the understanding of pedestrian crashes and provide design guidance to reduce pedestrian vulnerability.

Traffic Safety Policy

Despite these examples of manuals, design guides, and safety audits, road safety does appear to be marginalised in many African countries. Whereas road authorities were adopting environmental impact assessment policies and relocation policies, road safety issues were too often being overlooked. Training programmes and reorganisations of road authorities were sometimes giving little thought to road safety.

In Ethiopia, the recent Ethiopian Roads Authority Proclamation makes no mention of any safety responsibility and the only safety responsibilities are in a Health and Safety Unit which is primarily concerned with workplace safety. Nor had the Road Sector Development Programme required basic traffic signing and markings. In light of this situation, the ongoing Ethiopian Road Safety Study proposed the following traffic safety policy be considered for adoption in the Road Sector Development Programme to ensure consistent and optimal safety investment was achieved on road rehabilitation projects.

Table 7.2 Proposed Ethiopian Road Sector Development Programme Traffic Safety Policy

The following guidelines shall apply to all Road Sector rehabilitation projects:

11. **Road signs and markings** will be a basic/automatic component of any road rehabilitation project and this will involve updating and not simply replacing the existing insufficient signs and markings.
12. **Accident analysis** will be undertaken on available accident data. Road engineers must liaise with police and make effort to identify local accident pattern. Road engineers should also provide traffic police with strip maps of project road to facilitate future accident location referencing. Additional road accident monitoring (hospitals, community NGOs) should be required to identify all injury road accidents occurring. **Accident costs** will be included in the economic appraisal of a road project.
13. **Safety Audits** will be conducted on all major road schemes and **hazardous locations** identified by accident analyses or safety audits will be improved
14. **Speed reduction measures** will be implemented at locations where rehabilitated roads transect villages. These locations should be identified by the safety audit.
15. **No pedestrian priority crossings** to be allowed where operating/posted speed is more than 50 km/hour. Pedestrian facilities must be appropriate and not misleading.
16. **Education and publicity campaigns** will be conducted at all locations warranting speed reduction measures and schools within ½ kilometre of road.
17. For tender prequalifications, all roadwork contractors must undergo short (1-2 day) **contractor training course on traffic management at roadworks**. Roadworks are to be signed and include expected date for road signs and markings installation.
18. **Technical assistance to highway patrols and first aid facilities** on highways should be considered.
19. All **safety related reports and materials** will be provided to a road safety coordinator and will be shared with the other signees of this policy.

Source: TRI., 2000

7.2 Crash reduction (remedial measures)

An early, but still very useful, reference on road safety engineering is the “Road Safety Manual on Low-Cost Engineering Countermeasures”, produced in 1990 by UNECA. This manual covers such basics as what crash and road data should be analysed, the identification of hazardous locations, but the main focus was on common causes of crashes and recommended solutions. Examples were given of loss of control at junction, sharp bends, and straight bends, pedestrian collisions at different locations, as well as vehicles travelling in the same, converging and opposite directions. The manual contains a table of expected safety benefits by countermeasure and crash type with unit costs provided. Key safety aspects in road planning (road alignment, road width, sight distance and road environment) and in junction design (junction form, use of islands, sight distances, and bus stops near junctions) were also discussed. Design details of speed bumps, raised zebra crossing and rumble strips and guidance on improving a pedestrian crossing were also provided (UNECA, 1989).

In Tanzania, the engineers and the technicians from the Regional Engineer’s Office (REO) in Morogoro have benefited from training both inside and outside Tanzania on road safety. There is also a close cooperation between the police and the REO as the latter has a computer with MAAP5 installed and is responsible for entering the report forms completed by the police (Kiza and Kayoza, 1997).

The road authorities in Ghana are reported to have recently become more proactive on road safety issues. The Ghanaian Highways Authority now has a Safety and Environment Division which conducts safety audits on proposed schemes and also oversees hazardous location improvement programmes on their road network. The Department of Urban Roads has undertaken to identify the 100 worst urban crash locations in the country and is then to introduce a remedial measures programme (Ross, Nov. 1999). The World Bank is currently funding a Pedestrian Action Plan which focuses on remedial measures for hazardous locations for pedestrians (WB, 1999)

7.3 South African road safety engineering

South Africa has been very active in promoting pedestrian facilities, safety audits and has now produced a draft 7 volume road safety manual. Some of the key road safety engineering resources are summarised below.

The South African road safety manual: towards a safer millennium for South Africa

This paper contains the background of the development of the South African Road Safety Manual, a best practice, guideline document for road safety engineering practitioners. A brief summary of the contents of the various volumes is also included (Van Schalkwyk, I, Jul-99).

Pedestrian facility guidelines: manual to plan, design and maintain safe pedestrian facilities

The purpose of this manual is to provide guidance on the planning, design and maintenance of safe pedestrian facilities, both across and alongside roads and streets, namely mid block pedestrian crossings, pedestrian refuge islands, pedestrian facilities at intersections and junctions, scholar pedestrian crossings and sidewalks. Practical guidance and typical layouts are also provided with respect to the improvement of pedestrian safety at problem areas in cities, town and on rural roads. These places inter alia are: modal transfer points, pedestrian malls and other pedestrian orientated areas such as suburban shopping streets, industrial areas and pedestrian routes in residential areas. Specific aspects such as facilities for handicapped pedestrians in the street environment and pedestrians safety at road construction sites are dealt with (Ribbens, H, Mar-93).

Proposed guidelines to improve pedestrian safety at freeway interchanges

Annually more than 2000 pedestrians are killed and injured on freeways, especially at or near interchanges. Although pedestrians are not allowed on freeways, numerous pedestrians are crossing freeways at-grade or are using the interchange area as a modal transfer point. The study identified 40 interchanges throughout South Africa experiencing problems with pedestrians. The circumstances at 16 of these interchanges were thoroughly investigated. The findings of this study suggest that there should be a policy change with regard to the presence of pedestrians at freeway interchanges. Law enforcement has not had the desired effect to limit pedestrian activities. By providing safe pick-up and off-loading points on ramps, traffic safety in general and the channelisation of pedestrians through the interchange are will be improved. this document discusses a number of alternative installations. Guidelines for the layout of pedestrian facilities within the interchange area are given (De Beer, EJH, Mar-92).

The effect of rural road construction on the accident rate

The effect of rural road construction on the accident rate during and after construction was investigated. Data was collected from the Road and Traffic Administration Branch of the Cape Provincial Administration for 65 individual projects. At more than 75 percent of the sites an increase in the accident rate during construction was found. The largest increases were for multiple vehicle and damage only accidents. The most important finding of the study is that new regulations for traffic control during construction caused a significant reduction in the accident rate at these sites (Bester, CJ, Sep-93).

The revised K21: Identification and improvement of hazardous locations

The purpose of this manual is to provide a practical and easy-to-use method for identifying and prioritising hazardous locations in a given area, and to provide guidelines for establishing the most cost-effective remedial measures for a specific site. This manual is based on the CSIR Technical Manual K21, published in 1972. Although a much more simplified approach towards the identification of hazardous locations, and step-by-step procedures regarding the investigation of such sites as well as determining the benefit/cost ratio's of possible improvements are given in this manual, much of the information contained in the original manual is repeated in this document. To assist the user, a list of collision patterns, their probable causes and general countermeasures are given. Furthermore, the improvement recommended for various type of collisions are described and an estimate is given of the

degree to which these improvements could reduce collisions. Also included are updated collision costs and unit costs of road locations (Opperman, RA, Mar-91)

Safety devices short course

A short course on safety devices was developed on behalf of the South African Roads Board and presented at three locations in South Africa. The course was aimed at engineers, technicians and safety officials responsible for the design, installation and maintenance of road safety devices. The course was developed to provide a broad overview of road safety devices as well as related aspects affecting road safety. Notes had to be developed for a major portion of the course. A part of the course was, however, based on a number of research reports of the South African Roads Board and various South African design manuals. This provided a valuable opportunity for the dissemination of local research results to practicing professionals (Woods, DL, May-93).

The cost effectiveness of recovery areas and roadside furniture on rural roads

This report describes the hazard index model for determining the cost-effectiveness of alternative improvements to roadside hazards along South African rural roads. A collision probability model was developed to estimate the probability of a vehicle encroaching onto the roadside and striking a hazard. Basic encroachment rates of 0.0005 and 0,001 encroachments per kilometre per year were established for freeways and two-way two-lane roads respectively. Hazard indices were calculated using the estimated encroachment and collision frequencies, severity indices for various types of hazards, and collision and road authority costs. It is recommended that road authorities implement a hazard index model to determine the most cost-effective alternative when considering improvement to the roadside (De Beer, EJH, Mar-92).

Guidelines for pedestrian signing

This report discusses various aspects relating to the display of guidance signs aimed at pedestrians. Various aspects of these signs are discussed in comparison with overseas literature, current South African practice and implemented examples. Guidelines for aspects like the colour, shape, format, lettering style, size and placement are proposed. An overview of available symbolic signs and proposals for standardised symbols, where these do not currently exist, are made (Kooverjee, SG, Mar-95) .

N2 Murchison to Marburg pedestrian road safety audit & campaign

The audit and campaign are discussed in this paper. The audit was conducted in an effort to identify remedial measures aimed at reducing the number of pedestrian incidents in the area (Mileham, TL, Jul-99).

Towards road safety auditing in South Africa

This paper discusses safety audit in general while reference is made to some initiatives in South Africa. A framework for road safety auditing in South Africa is also proposed (Ferreira, RN, Sep-99).

Safety in Traffic Operations Programmes manual: a tool to assist road authorities with the evaluation of road safety for rural roads on a network level

This paper aims to give a brief introduction and overviews of the STOP (Safety in Traffic Operations Programmes) Manual. The discussion touched on the aims of the STOP Manual, its framework and the basic principles and procedures used during the evaluation process, without going into too much technical detail. The STOP manual was developed to provide authorities with assessment procedures to evaluate rural roads on a network level, in order to determine segments with a poor safety performance and to assist authorities with the effective allocation of funds for remedial measures (Prinsloo, JJA, Sep-99).

Evaluation of speed humps

In 1995 the Centurion Town Council started implementing traffic calming devices such as speed humps, mini-circles and raised pedestrian crossings. To evaluate their effectiveness and desirability, the Council performed before and after studies at some of these facilities. The study used evidence obtained by measurements on main traffic aspects, such as flows, composition, speeds, headways, noise and subjective opinions of both motorists and residents. The methodology applied in the study and the outcome thereof is briefly described in this paper (Slavik, MM, Sep-97).

A performance evaluation of traffic safety barriers in use in South Africa

In 1995 the University of Pretoria, as part of a concerted research endeavour to alert authorities to roadside hazards, launched a study concerning the evaluation of the performance of traffic barriers. The major finding of this study was that in certain circumstances, the use of specific concrete barrier designs, compared to steel guardrail and cable systems, have economic and safety benefits. Based on the findings of the research, the use of the single slope concrete barrier design was recommended for use in South Africa. A need for standard designs and guidelines for concrete barrier use in South Africa was also identified. This paper provides a brief overview of the study (Van Schalkwyk, I, Sep-97).

(Germiston - pedestrian study: an investigation in hazardous locations and recommended solutions)

The study investigates pedestrian hazardous locations occurring at intersections, mid-block and on freeways in Germiston. Recommendations are made for the improvement of pedestrian safety at the identified hazardous locations (Ribbens, H, Mar-90).

Speed control at roadworks

Existing and alternative methods of setting speed limits and controlling speed at roadwork sites, used by road authorities, contractors and consultants locally and overseas, were investigated (De Beer, EJH, Jul-90).

Safe pedestrian facilities: user manual on planning and design

This document provides guidance on the planning and design of safe pedestrian facilities and practical guidance and solutions in respect of the improvement of pedestrian safety at problems areas in cities (Ribbens, H, Mar-91).

Road markings: General review and recommendations

The report deals with road markings in general and covers various topics related to road marking practice, including materials, road safety and costs. Recommendations aimed at improving road marking practice are made (Coetzee, CH, Mar-89).

Proposed guidelines to improve pedestrian safety at freeway interchanges

There should be a policy change with regard to the presence of pedestrians at freeway interchanges. Law enforcement has not had the desired effect to limit pedestrian activities. By providing safe pick-up and off-loading points on ramps, traffic safety in general and the channelisation of pedestrians through the interchange area will be improved. This document discusses a number of alternative installations. Guidelines for the layout of pedestrian facilities within the interchange area are given (De Beer, EJH, Mar-92).

Proposed guidelines to improve pedestrian safety at freeway interchanges

This report conveys the findings of a literature survey on current practice, locally and abroad in terms of pedestrian and modal transfer facilities at freeway interchanges as well as a detailed study conducted at several urban and rural freeway interchanges. Guidelines are proposed for the provision, layout and safe locations of pedestrian and modal transfer facilities at these interchanges. The elimination of undesirable pedestrian activities is also catered for (De Beer, EJH, Mar-92).

National guidelines, standards and warrants for traffic calming measures - a literature review

This report entails a detail literature review into traffic calming. The origin of the concept and its application overseas and in South Africa formed part of the research. The need for traffic calming, public participation and types of measures that are generally used in traffic calming schemes are discussed in this report (Theyse, M, Nov-94).

Towards a traffic calming policy for Class 4 and Class 5 residential streets

This report forms part of a study of a portion of Dennegeur Avenue, as an experimental section, where certain calming measures was investigated, implemented and evaluated. This report gives suitable description of proposed traffic calming standards and amendments of the existing policy and the application of traffic calming warrants. The traffic calming policies of other local authorities are also discussed. The City of Cape Town has adopted a traffic calming policy which allows the implementation of traffic calming measures on lower order residential streets only (Groenewald, M Dec-99).

8 TRAFFIC REGULATIONS AND LAW ENFORCEMENT

8.1 Traffic regulations

In recent years, many African countries have updated their traffic regulations, although a few, like Ethiopia, still have national traffic regulations dating back to the 1960s. The Southern African Transport and Communications Commission (SATCC) produced a Model Code on Traffic Regulations in an attempt to promote regional harmonisation of traffic regulations among African countries which has been an ongoing objective (SATCC, 1992).

8.2 Traffic law enforcement

8.2.1 Resources

Traffic police are notoriously under-resourced. As of 1997, the Traffic Police in Uganda had only two stop watches for speed enforcement while the Zambian Traffic Police had no speed detection equipment (apart from their own speedometers), very few motor vehicles (3 patrol vehicles for Lusaka) and a reflective vest for only one out of every 11 traffic police officers in Lusaka (Cripps 1998, Aeron-Thomas 1998).

8.2.2 Training

The Kenya/Finland Road Safety Project included training the Kenya Traffic Police and procuring traffic enforcement equipment as one of the first objectives. Traffic enforcement courses were conducted between 1981 and 1986 and a manual, Traffic Police Notes on Road Safety and Traffic Law Enforcement, was developed. The manual reviewed the basic operations involved in speed control, enforcement of driving habits, driving without headlights, dangerous parking, enforcement of drunken driving, condition of vehicles, overloading of vehicles, checking of documents. Road safety education, publicity campaigns and crash investigation were also covered as were user instructions for the new equipment, i.e. radio telephone, breathalyser, etc. (Hassel, 1991). This manual is very practical with good illustrations and well-presented.

Traffic police training was a key objective of a British Council project in Uganda. A traffic police specialist provided training to 15 traffic police trainers and conducted 2 day workshops for Senior Police Officers in 1997. The traffic police training course covered the areas of: Vehicle classification, vehicle technology, examination of vehicles, enforcement of speed, reckless/careless driving, overloaded vehicles, parking and obstruction, investigation of accidents, awareness of hazardous substances, safety at road checks, road safety education,

publicity and training, and traffic control (Cripps, 1997). A follow-up visit allowed for both evaluation of the training and refresher training (Cripps, 1999).

8.2.3 Strategic Plans

The police have been encouraged in many countries to develop strategic plans in an attempt to promote a more pro-active management approach with targetted deployment of the scarce resources available to police. DFID (then Overseas Development Administration) assisted the Zambia Police Service in 1995 to develop a strategic plan and the traffic management section is presented in Figure 1.

The Zambia Police Service Strategic Plan also included a timetable with implementation responsibilities identified and suggested measurements of achievement.

Figure 1. Zambia Police Service Strategic Plan Traffic Management Section

<p>POSITION NOW</p> <ul style="list-style-type: none"> -Road accidents on sharp increase -Traffic Police have a reputation for corruption/poor attitude -Traffic management ability limited -Limited resources <p>AIMS</p> <p>To promote Road Safety and develop Traffic Management ability to change the behaviour and the image of traffic police and to increase the technical resources available to them to carry out their function.</p> <p>ACTIONS</p> <ol style="list-style-type: none"> 1. To develop a Traffic Strategy that will bring up to date traffic law enforcement in the country. 2. To provide training to traffic officers that will result in a friendly, courteous and firm traffic law enforcement. 3. Feasibility study into the use of civilian traffic wardens. 4. To introduce road safety into primary and secondary schools. 5. To reduce accidents on roads. 6. To improve ability to provide First Aid treatment of accident victims. 7. To improve on the traffic police response speed and efficiency, to increase mobility of traffic teams. 8. To acquire modern equipment; such as speed traps, alcohol testing equipment, tapes, etc.
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Source: Zambia Police Service, 1995

Corruption was highlighted in several of the reports and the Kenyan Automobile Association was reported as having recommended that citizen groups be established to monitor police enforcement (Assum, 1998)

8.3 South Africa Traffic Law Enforcement

KwaZulu-Natal Road Traffic Inspectorate has published its own road traffic safety strategy (1996-2000). "Saving Lives" is a comprehensive and well-researched document which was produced after a study tour to Victoria, Australia. The Strategy includes information on the crash statistics, the Road Traffic Inspectorate organisational structure, Mission Statement and the Inspectorate's Code of Ethics. Projects were proposed for the 16 priority areas identified which included: drinking and driving, speeding, pedestrians, heavy vehicle operations, restraint wearing, drivers in high-risk groups, drugs and driving, road quality, vehicle roadworthiness, drivers licenses, legislation, co-ordination, statistics, information systems, moving violations, and staffing levels. For each priority areas, a problem statement is given and the proposed remedial measures stated. For instance, the project on moving violations was said to involve educating the public on the consequences of violating traffic regulations and the use of unmarked vehicles and camera technology to prosecute offenders (KwaZulu-Natal Road Traffic Inspectorate, 1996).

The South African Police Service (SAPS) developed a proposed policy on treatment /interaction with road victims. It included the following 15 points:

1. Every effort must be made by a police or traffic official to determine the identity of a deceased or seriously injured person.
2. It is their responsibility to make arrangements to have a message conveyed immediately to the next-of-kin/close friend.
3. A death message must be conveyed in person.
4. A police or traffic official must ensure that an accident is attended to and the on-site investigation carried out in a professional manner.
5. A police or traffic official must ensure that all accident scenes are professionally safeguarded.
6. Every effort must be made to determine whether there were independent eye witnesses to an accident.
7. It is essential to have training in basic life-support and/or first aid.
8. Arrangements must be made for the safekeeping of all property of a police or traffic official to make arrangements for a tow-truck to tow the damaged vehicle of the deceased or seriously injured person.
9. All accidents which are subject to a police investigation, must be followed up with a proper and thorough police investigation, so that prosecution can result.
10. The establishment and/or implementation of victim-support partnership initiatives must be encouraged.
11. Professional conduct.
12. Understanding and sensitivity
13. Making of decisions must be in the best interest of justice and the victims at all times (Robot, Spring 1998).

Many police forces in the UK have adopted such codes but this was the only country identified in Africa which had considered victims needs and how police should respond.

The following traffic law enforcement references have been published:

The relationship between fines and offences

A research study was conducted to determine what the effect of increased fines and stricter law enforcement respectively would be on traffic offences. A literature study was also done to assess other countries' policies regarding heavy vehicle overloading as well as to determine if previous research could reach any conclusions about fines, enforcement levels and traffic offences. Regarding the relationship between fines, law enforcement and offences it was decided to concentrate on both heavy vehicle overloading offences and offences committed by general road users, e.g. speeding, seat belt and traffic signal offences. Historical data were analysed to determine if there was a relationship between law enforcement and offence rates. Because no definite conclusions could be drawn from existing data, it was decided to conduct an opinion poll to determine whether road users knew of the fines structure and to obtain their views on increased fines and stricter law enforcement. The study indicate that road users were uniformed about the fines structure and that offences could only be curtailed by better communication and marketing, together with a combination of higher fines and stricter law enforcement (Davis, C Apr-95).

The attitude of minibus drivers towards traffic law enforcement

The attitude of taxi drivers towards traffic legislation and traffic law enforcement was investigated. The main problems identified were bad communication and disrespect between law enforcers and taxi drivers, the uncontrolled influx of new taxi drivers into the taxi

industry and the competitive nature of this industry. There is a need for constant training for both traffic law enforcers and taxi drivers if the problems of the taxi industry are to be addressed. The relationship between traffic laws and road safety should also be emphasised during training and ticketing procedures (Botes, G, Mar-93).

Alternative approaches to the enforcement of traffic laws relating to specific violations by freight and passenger operators and motorists

The feasibility of using electronic or other alternatives to manpower-intensive methods to monitor, deter or apprehend traffic violators is investigated in an attempt to release traffic officers for other law enforcement duties. This is particularly important as, in the light of recent announcements to reduce the numbers of civil servants, the shortage of traffic officers is likely to increase. Four traffic violations were selected for investigation on the grounds of their importance for road safety and the protection of the already threatened road infrastructure. Those selected were alcohol and drug abuse, excessive speed, unroadworthy vehicles and overloading of freight and passenger vehicles. The unique law enforcement problems pertaining to each are described and possible solutions are discussed (Van Kralingen, WN, Mar-92).

Attitudes of traffic officers to minibus-taxi drivers The relationships between traffic officers and minibus-taxi drivers have always been strained. Various factors contribute to this, including the rift between the race groups in South Africa, the frustrations that traffic officers experience in the performance of their duties and the tense contact situation. Although these factors have to be taken into consideration when assessing the relationships, it is also vital to consider the personality profiles of the men who choose the traffic profession as their career (Sonderling, NE, Mar-92).

Following too closely: (a) Recommendations for a criminal following time (b) the development and introduction of suitable enforcement equipment

This report discusses local and overseas statistics on rear-end collisions, as well as legal problems with prosecutions for following too closely. The prescription of a measurable objective following time is proposed and "safe", "unsafe" and "criminal" following times are defined (Botha, TJ, Aug-89).

The administrative adjudication of road traffic offences Discussions around the establishment of the Road Traffic Management Corporation in terms of road traffic offences is supplied (Van Tonder, H, Jul-99).

9 DRIVER TESTING AND TRAINING

Apart from South Africa, the driver testing and training references found from Africa were from Botswana and Ghana. The 1996 Botswana Accident Report reviewed the progress made and activities undertaken in driver training and examination, theory tests, driving instructors' training and examination and vehicle examination (Department of Road Transport and Safety, 1997)

An assessment of driving instruction in Gaborone included was based on surveys of drivers, driving schools and a review of recent driving test results. The survey of drivers and driving schools in Gaborone was conducted to assess the effectiveness and quality of professional driving instruction as driving schools are uncontrolled in Botswana (Oladiran and Pheko, 1995). The questionnaire contained 36 questions covering: demographic details, type and condition of vehicles used for training, frequency and amount of instruction, topics covered during training, previous L-test attempts, accident record of candidates and cost of taking driving instruction. Of the 400 randomly selected drivers who participated in the survey, 70 per cent were male.

Driver survey findings revealed the following:

- Few students receive any night-time training
 - Male student drivers received more professional training than females
- While the vast majority were taught road signs (94%, training in traffic offences and penalties was low (32%) and only 2% claimed to have received any defensive driver training. Over half said they had been taught about the causes of driving. Survey findings were limited to relative percentages and the share of drivers receiving driver training or driver licensing status was not given. Unlicensed drivers posed a problem as the Ministry of Works had identified 36 per cent of all drivers killed in road accidents as being unlicensed.

Pass rates overall at the four main testing stations had improved between 1992 (22-36%) and 1993(25-43%). It was hypothesised that this was due to the increased number of driving schools which were enforcing the mandatory training period of 6 months.

Driving schools surveyed included the 33 registered in Gaborone and some of the non-commercial driving schools as well. The 40 question survey included details of available facilities and staffing, demographic information about trainees, and accident and L-test pass records of the institute. The driving school survey revealed that no training was being conducted on pick-ups despite their accounting for the majority of the nation's vehicles and being involved in 40 per cent of all crashes. The study concluded that driving standards would be improved by standardising the driving schools and monitoring their performance (Oladiran and Pheko, 1995).

Commercial drivers were the focus of a research study in Ghana. Commercial vehicles account for 46 per cent of all registered vehicles in Ghana, have higher occupancies and greater kilometrage travelled (Mock et al, 1999). A community based survey was undertaken in Ghana which both estimated the involvement of commercial vehicles in road injuries and assessment of the current knowledge, attitude and practices of commercial drivers. Of the 122 motor vehicle related injuries (those which had occurred in the previous year and had resulted in at least 1 day's work) identified in a survey of 21,105 people, commercial vehicles were involved in 81 per cent of related injuries with buses accounting for half (Mock et al, 1999). While commercial vehicles were found to be equally involved in pedestrian crashes and motor vehicle crashes, commercial vehicles had a higher involvement rate in children's injuries (95%) than adults (79%).

Focus group discussions were conducted with 30 commercial drivers in a lorry park in Kumasi. Groups were limited to 5-7 drivers and organised by specific types of drivers (taxi and mini-bus), i.e. type of vehicle driven and destination. Drivers were asked general questions on the cause of crashes and how they can be prevented as well as specific questions on vision, alcohol, fatigue, vehicle maintenance, and seat belts. Drivers were also asked to identify some traffic signs. No limit was set on drivers' responses and discussion lasted between 1-2 hours.

Despite showing a positive attitude towards safety and basic knowledge of the effect of alcohol, driver vision, vehicle maintenance in contributing to crashes, drivers did not appear to put into practice what they knew. For instance, few drivers had had their vision checked and most reported only using seat belts on long journeys. Traffic signs posed a problem with 70 per cent incorrectly identifying the sign for "sharp bend ahead". For contributory factors in road crashes, the drivers listed economic pressure with high rental rates pushing them to drive long hours and while exhausted. Limited availability and the high cost of spare parts and tires also contributed to crashes whereas many imported vehicles did not include seat belts. Brake fluid was often watered diluted with soap and water to save money. Drivers thought that crashes could be reduced if the cost, quantity and quality of spare parts could be improved, towing services expanded to allow prompt removal of broken down vehicles, free or low cost vision testing for drivers and stricter licensing and testing of drivers.

A summary of the Petroleum Road Transport Safety Limited facility where defensive driver training and vehicle inspections are offered is included in Section 5.3 Private Sector Participation. Public sector capability in driver training and testing is also being improved under a SIDA funded project. The 3 year project will develop and introduce a new driving test (both theory and practical aspects), training of 100-200 persons including driving examiners, driving instructors and trainers as well as the establishment of formal procedures and criteria for regulating driving schools and driving instructors (Ross, Nov 1999).

In 1989 the UNECA commissioned TRL to produce a guide for Heavy Goods Vehicle (HGV) drivers. Evaluation in the development stages (Downing, 1989) indicated serious groups in professional driver's knowledge of safe driving practices and demonstrate a 13 percent improvement in drivers' text scores after reading this guide.

The study also indicated that advanced driver training courses were provided by a large number of large fleet operators and, in Zimbabwe, the ZTSB run defensive driving courses were reported (Sandwith, 1980) to result in large drops in company driver's crash rates.

9.1 South African Driver Testing and Training

CSIR has produced the following publications on driver training and testing:

Contribution of human factors to combi-taxi collisions

The report investigated two human factors which could possibly play a role in Combi-taxi collisions, namely attitudes and pressure. The investigation revealed that Combi-taxi drivers are aware of the importance of road safety, but do not always take it seriously and are not always aware of the rules of the road. They are subjected to a great degree of pressure. There is a perception that they are not considerate towards their passengers. It is recommended that ways be found to alleviate the pressure on them, and that the acquiring of cognitive skills be incorporated as an essential part of all driver training courses, which would again facilitate attitude change of drivers (Sonderling, NE, Mar-91).

Graduated licensing system

The number of young people applying for drivers' licenses in South Africa are increasing dramatically and it is estimated that by the year 2000 approximately 2,6 million inexperienced drivers will be applying for licenses. The drastic increase in novice drivers will have a subsequent increase in collisions and fatalities. It is proposed that there should be multiple levels to which the novice driver can be gradually exposed to the traffic situation in the safest possible manner until he has proved to be a mature and experienced driver (Coetsee, TN, Sep-99).

Contribution of human factors to combi-taxi collisions This report investigated two human factors which could possibly play a role in Combi-taxi collisions, namely attitudes and pressure. The drivers are aware of the importance of road safety but do not always take it seriously and are not always sure of the rules of the road (Sonderling, N Mar-91).

The development and application of a training programme to enhance occupational skills of minibus-taxi drivers

A basic training programme for minibus-taxi drivers, tailored to the particular needs of the minibus-taxi industry, was developed and piloted. It is designed to enhance the occupational skills of drivers in the industry, and is aimed at overcoming the problems of inadequate basic education and minimal exposure to managing financial matters by minibus-taxi drivers. The programme consists of eight modules and covers areas not conventionally within the ambit of driver training programmes (Miller, PK, Mar-91).

The application of a programme of action designed to enhance the basic driver skills of combi-taxi drivers

A basic driver training programme for Combi-taxi drivers, tailored to the particular needs of the Combi-taxi industry, developed. It forms part of a four-pronged approach to improve the quality of drivers in the Combi-taxi industry, and is aimed at overcoming the problems of inadequate basic education and economic exposure of Combi-taxi drivers. The programme consists of eight modules and covers areas not conventionally within the ambit of driver training programmes (Miller, PK, Mar-91).

The likely evolution of the combi-taxi and bus industries: implications for public transport planning and funding The report examines the implications for national and local funding and planning authorities on the evolution of the combi-taxi and bus industries under two policy scenarios. The effects on operators, support industries and road safety are also considered (Smith, RA, Mar-92).

10 VEHICLE SAFETY

Very little was found documented on vehicle inspection or safety regulations. The responsibilities of the Vehicle Examination Section in Botswana were briefly summarised in an evaluation report (Davey, 1996). The 1996 Botswana Annual Accident Report commended the Vehicle Examination Section for having produced a very useful "Guide to Roadworthiness Testing for Motor Vehicles" which was written in layman's terms. Zimbabwe is reported to be benefiting from a major technical assistance input from SIDA to establish regional centres for vehicle testing.

The functions of the Vehicle Examination and Licensing Department (VELD) in Ghana were recently reviewed and consideration given to privatisation. It was decided that the VELD would be restructured and the headquarters would be separated from the Accra Testing Station (Kwakye et al, 1997)

Vehicle registration data is being computerised in Zambia but there is little information collected on vehicle inspections although the Police reported 20 per cent of injury crashes to have been caused by vehicle defects (tyres, brake failure, lack of lights). A vehicle defect rectification scheme was conducted during the Traffic Safety Month (October 1996). A grace period of two weeks was allowed for vehicle defects to be repaired with defaulters having their names published in the local newspapers (Aeron-Thomas, 1998).

10.1.1 South African Vehicle Safety

Examples of both primary and secondary vehicle safety research were found in South Africa.

Evaluation of braking performance of loaded minibus-taxis The braking performance of loaded minibus-taxis is evaluated in this report. This is done with specific reference to the replacement and "pirate" replacement parts which are compared with the braking components of the original equipment manufacturers (Meintjes, HS, Aug-92).

The motor vehicle tyre in road safety

Tyres are a relevant factor in approximately 11% of motor vehicle accidents. As such they are an extremely important aspect of road safety. Aspect such as thread depth, cord damage, inflation pressure, vehicle loading, rubber conditions and repair techniques all influence the safety of the tyres. These aspects are briefly discussed in this paper (Duff-Riddell, WR, Sep-97).

Bus safety standards: (guidelines on reduction of the flammability of interior materials) The problem of flammability of materials used for the interior of passenger buses is reviewed. Tests done on currently used materials, as well as new materials are discussed. Methods to reduce the risk to bus occupants are discussed. A recommendation on where the bus industry and the legislative bodies should aim to be with regard to the subject of flammability of interior materials is put forward (Thomas, AW, Jun-88).

11 ROAD SAFETY PUBLICITY

In Zimbabwe, publicity campaigns are organised by the National Road Safety Committee which includes a representative from the Zimbabwe Traffic Safety Board, Zimbabwe Police and Shell with rotating committee leadership. Road safety campaigns had previously been conducted on a monthly basis but the Committee realised that these were too short to have any effect. It has adopted a quarterly campaign programme and the calendar for 1999 included the Negligent Pedestrian for the first quarter, followed by Vehicle Defects, then the Use of Seat Belts. The year was to end with a campaign on Don't Drink and Drive and a recapture of the previous three.

The Federal Road Safety Commission in Nigeria was reported to conduct public enlightenment programmes that included:

- Public enlightenment workshops and seminars on drivers improvement course.
- Motor park rallies involving the drivers' association and passengers
- Use of drama sketches (an acknowledged medium of communication in Nigeria)
- Literacy campaign emphasising highway code and road signs literacy
- Participants observation method involving the deployment of regular marshals in mufti to board public transport and monitor activities of road users.
- Massive large scale campaigns during festive periods
- Special campaigns for selected targets such as ministries, institutions, banks, media houses, truck drivers and road related industries.
- Focusing attention on passengers who tend to be unaware that accidents claim more passengers than drivers lives (Yakasai, 1998).

The Ethiopian Road Safety Study has recommended a publicity campaign be conducted using the methodology of the AIDS prevention project which targeted transport workers and was conducted by the Integrated Service for AIDS Prevention and Support Organisation (ISAPSO). Transport workers are viewed as a "hard to reach" group and are vulnerable to both AIDS and road crashes.

The Road Transport Authority assisted by identifying transport companies willing to participate. Seven companies participated and seminars were given for the transport company managers, labour union leaders, and board members. Peer educators were then recruited and trained on informal education skills.

The project also undertook a baseline Knowledge Attitude Practices and Behaviour survey. Educational materials were then customised to the findings from the survey and included songs and dramas on tape cassettes, leaflets on sexually transmitted diseases, pocket diaries with risk assessment messages, stickers, T-shirts and posters. The materials were distributed to drivers, assistants as well as other transport workers such as office staff and tape cassette players were loaned to bus drivers.

Regular monitoring was conducted and during an 8 month implementation phase, over 250,000 travellers were estimated to have heard the tapes. In addition, peer educators were estimated to have worked with over 2000 transport workers. A formal evaluation is to be conducted at the end of the project but the indications are that learning through entertainment without affecting the work schedule holds much potential (UNAIDS ETHIOPIA, March

1999). Such an approach should be considered for road safety as the target group is similar and both require a reduction in personal and social risk.

11.1 South Africa's Road Safety Publicity

Drive Alive, South Africa's national road safety campaign, is discussed under the section on Private sector participation as much of the funding for the campaign was donated.

Despite a much higher level of motorisation, South Africa shares with Ethiopia a serious pedestrian safety problem. Over 40 per cent of the road fatalities in South Africa are pedestrians and over 10,000 are seriously injured every year while walking on the roads. The South African Road Safety Technical Committee formed an Adult Pedestrian Working Group which produced a manual and a flipchart targeting adult pedestrians. These teaching aids were chosen for their flexibility and low cost.

The campaign targets the five key areas of

- Visibility
- Jay walking
- Alighting and crossing
- Speed judgement
- Drinking and driving

The manual and flipchart are to be distributed by the Department of Transport to all its provincial counterparts for use at the grassroots level. (Robot, Autumn 1999)

12 TRAFFIC SAFETY EDUCATION FOR CHILDREN

Early road casualty data analysis found children to account for a higher share of road casualties in developing countries. Donor agencies have supported the development of traffic safety materials for children as not only did they appear to be more vulnerable but they were also keen to instill good habits early in life to avoid the need to break bad habits later.

A DFID funded research programme into reducing child pedestrian casualties began with a survey of the current situation with regards to traffic safety education in schools (Sayer and Downing, 1996). A two-part survey was conducted with the first surveying Ministries of Education around the world while the second part surveyed schools in Botswana, Pakistan and Zimbabwe. 50 questionnaires from 43 different countries (13 from LMCs) were analysed to determine how many were including traffic safety in the curriculum, if it was a separate subject or included as component in another subject, and if there were government issued traffic safety guidelines.

The school surveys were targeted at teachers and covered such questions as the teachers' views on teaching methods, priority topics, resources available, outside support, time spent on road safety topics, problems encountered and improvements needed, and cyclist training. Teachers in 132 schools in Botswana and 383 schools in Zimbabwe were surveyed.

DFID and TRL followed up this survey with a study in Ghana which had five key objectives:

- Investigate Ghana's child pedestrian casualty problem
- Produce and evaluate a Road Safety Education resource for use by primary school teachers.
- Identify a suitable teacher training method for use in the developing world
- Produce materials to be used for teacher –training
- Provide good practice guidelines for policy makers, administrators and advisors in the education field

A report was published which focused on the research involved in evaluating the resource (Sayer et al, 1997) while the Guidelines were produced separately as an Overseas Road Note 17 *Guidelines for good practice in primary schools* (TRL, 1997).

While the traditional approach has been to introduce traffic safety into the school timetable and work within the formal education system, in Africa, many children cannot afford to attend school. Non formal education programmes tend to focus more on the practical and topics of direct relevance. Radda Barnen have included traffic safety lessons in their proposed Alternative Basic Education programme syllabus. A common syllabus for non formal education programmes has been submitted to the Ministry of Education for approval and several NGOs are already pilot testing the syllabus. Materials and training are lacking with regards to traffic safety lessons as these have been the previous responsibility of the Traffic Police (TRL, 2000).

The Ghana research also led to the production *Safe Ways*, a road safety education resource for teachers of primary children, (TRL, 1996) and a companion volume, *Teaching the Teachers*, which was a step by step guide to running a road safety education workshop for primary school teachers (TRL, 1996).

Child to Child

The Child to Child (CtC) approach, started in 1978, is based on the direct involvement of children in the decision making and channelling of health information. It is not an alternative programme but an approach which can be used within broader health programmes. Children are encouraged to select and assist in the design of the topics and materials. Previous topics have included personal and community hygiene, the effects of smoking, AIDS and sex education. CtC have included several traffic safety worksheets in their suggested manual and at present, CtC is used in over 60 countries. The lessons are locally selected and while Zimbabwe was keen to promote the traffic safety lessons, in Ethiopia, the CtC coordinating agency, Forum for Street Children-Ethiopia (FSCE), had not thought of including traffic safety lessons in its programme. Over the last seven years, FSCE has worked with the local police in establishing child protection units and trying to get the police to view street children as children rather than small criminals.

12.1 South Africa Road Safety Education for Children

South Africa has done much to promote traffic safety education for children but the references provided so far only mention one report. The Scholar Programme and STEP programme are two initiatives that still deserve to be documented.

Moving through road safety education

The lack of effective road safety education in South African schools and the implementation of a formal road safety education course for student teachers are discussed (Drotske, L, Sep-99).

13 MEDICAL SERVICES

The role of the medical community in reducing road trauma should not be seen to be limited to the immediate post crash stage and that of the emergency medical services. Medical leaders have led the campaign for road safety in many countries, including both the United States and Australia.

In South Africa, the Medical Research Council (MRC) has been active in highlighting the human burden of road crashes. It publishes policy briefs as a means of disseminating research results and influencing decision makers. In 1998, a policy brief on road trauma was released,

entitled "South Africa road traffic trauma: The Way Forward". The brief discussed the following:

- The damage done: national cost, average daily road fatality and casualty toll, relative share of trauma mortalities, low-cost recovery from patients, and impact of disability on individuals as well as nation.
- International comparisons: deaths per 100 million kilometres travelled.
- Impact of past and present policies: contributory factors of increased freight traffic, overloading and poor road maintenance, poor public transport system, increased legislation without any accompanied rise in enforcement resources, and lack of consideration to pedestrians (40% road deaths).
- Importance of Speed: vulnerability of pedestrians in collisions with higher impact speeds, nighttime collisions, poor enforcement of speed restrictions, including heavy vehicles, inappropriate speed limit for gravel rural roads. When speed restrictions were enforced during the 1973-79 oil crisis, road fatalities decreased (but not fuel consumption, i.e. kilometres travelled) and then increased once speed limits were relaxed.
- Role of abuse of alcohol and other substances: Almost three quarters of all adult pedestrian fatalities (72%) had blood alcohol levels .08 g/100ml or more, compared with 16 per cent of the adult population after office hours. The involvement rate is even greater for drivers under the influence of alcohol (48% driver fatalities but only 7 % all drivers). Cannabis is also being found in road casualties (20% injured pedestrians and 29% injured drivers) but drug detection capability in South Africa is very limited.
- Seatbelts and Child Restraints: Despite being mandatory for over 20 years, front seat belt usage was only 60 per cent. Rear seat belts became mandatory in 1996 and use of child restraints is still optional.
- Protective headgear: Good compliance with crash helmets for motorcycle riders and passengers (mandatory since 1974) but cycle helmets are optional and usage is uneven.

Recommendations included increased investment in enforcement with specific mention given:

1. Speed law enforcement
2. Focus on mobile traffic offences
3. More resources allocated at night when fatality risk triples
4. Roadside detection of substance abuse

In addition, other recommendations included more priority given adult pedestrian problem and role of alcohol, improved public transport, conspicuity campaigns. The need for a central, national authority on road safety was also suggested and the development of a national safety culture through publicity and education campaigns. The Arrive Alive campaign was commended and recommended extended (MRC, 1998)

Medical references related to the road safety situation fell into two main categories: Data collection and epidemiological or trauma studies and emergency medical services.

13.1 Trauma surveys

The problems associated with the current state of health statistics in sub-Saharan Africa were discussed in a Lancet article in 1998. The mortality rates and cause estimates for Africa in the Global Burden of Disease were criticised for being based on the 1 per cent of the sub – Saharan population included in the health statistics of South Africa and

“Since there are no data, the numbers are guestimates; representations of reality formed from models, extrapolations, and common sense, constrained largely by the need to avoid conflict with previous estimates “(Cooper et al, 1998).

The GBD projections from sub-Saharan Africa were recommended not to be used until they could be cross-checked with data.

The 1996 Road Safety Seminar in Kampala inspired the establishment of the Injury Control Centre-Uganda by one of the trauma surgeons attending the seminar. Funding has been received from the Canadian Network for International Surgeons and the first objective was the collection of trauma casualty data. The programme has now expanded to five hospitals in Kampala and covers all trauma casualties, i.e. not just road casualties. The research is intended to identify those social groups most at risk and monitors such factors as age, occupation, activity and attitude. The ICCU also shares the information collected through seminars for medical and road safety professionals (Cripps, 1999)

The ICCU was also reported as resulting in the introduction of the Injury Prevention Initiative for Africa (IPIFA) in which trauma surveys are conducted in several other countries including Ethiopia, Egypt, Kenya, and South Africa. Regional collaboration has also been promoted through seminars (Cripps, 1999).

WHO introduced a Road Injury Prevention Initiative in Africa which focused on establishing trauma registries in hospitals and developing reliable trauma databases.

Community surveys have also been undertaken in an attempt to accurately measure the incidence of injury.

Eldorado Park, a township in Greater Johannesburg of approximately 85,000 residents, has applied to become a member of the Safe Community Network under the WHO Collaborating Centre on Community Safety Promotion, Karolinska Institutet (Karolinska Institutet, 1998). The Health Psychology Unit Centre for Peace Action (CPA), a Collaborating Centre for Injury and Violence Prevention, has been working with the community in Eldorado since the late 1980s. The findings of early hospital based epidemiological study of injuries were disseminated through meetings with a variety of organisations ranging from local community groups to international donor agencies. A violence prevention programme was subsequently with the clear establishment of objectives, targets and monitoring procedures an early priority. Difficulty in evaluating effectiveness led to household surveys of injury patterns and risk factors which in turn resulted in the “three neighbourhood safety promotion programme”. Survey findings from a sample of over 1000 homes identified traffic injury as second to violence, but with wide ranging injury rates between the neighborhoods due to such factors as the varying local road environment. Appropriate interventions such as the provision of safe pedestrian crossings and various environmental modifications to high risk roads were recommended.

An earlier study of childhood injury patterns at Alexandra, a different South African urban township also within Greater Johannesburg also found traffic injuries to be the second main cause of injury (14%) , compared to violence (35%) (Zwi et al, 1995). The traffic injury rate for girls varied with young girls (under the age of 5) reporting over twice the traffic injuries as boys of the same age. The pattern then reversed for children between the ages of 5 and 9 with boys reporting 84 per cent more injuries than girls. For those aged 19-14, boys had a slightly higher traffic injury rate (17 % more).

A recent epidemiological study in Ghana, funded by the American Association for the Surgery of Trauma, investigated the incidence, characteristics and consequences, including costs, of injuries in both a rural and urban area (Kumasi). A total of 21,105 people were surveyed about injuries which had occurred in the past year which had resulted in at least one day of lost normal activity and any other injury which had resulted in lasting disability. A total of 198 traffic injuries were identified from the sample, slightly less than 1 per cent injury rate. The economic impact was also estimated with out of pocket treatment costs and loss days of normal activity. Traffic injuries were found to account for only 16 per cent of urban injuries but 75 per cent of all urban injury related deaths.

The annual traffic mortality incidence in Ghana was reported to be higher than that in the USA. The study concluded that with respect to the incidence rates, disability times, treatment costs and economic consequences, injury control, especially that of traffic injury, merited greater attention from organisations involved in international health (Mock et al, 1999).

13.2 Emergency Services

The role of the medical sector is often limited to the immediate post-crash stage involving the emergency medical services. There is a wide range of emergency medical services in Africa depending on the location of the crash and the insurance coverage of the casualties. Air ambulances exist in several African countries but for the most part, ambulances are limited to urban areas and in some countries such as Ethiopia where the Red Cross provide ambulance services, few road casualties are transported by ambulance. As of 1995, Kampala was reported as not having any ambulance services for the general public and a project proposal for 5 ambulances and a supervision car was developed by St John's ambulance (St John Ambulance, 1996) A 3 month survey at the University Teaching Hospital in Lusaka reported 35 per cent of road casualties transported by Good Samaritan, 26 per cent by their own vehicle, 21 per cent by police vehicle and only 5 per cent by government ambulance (Kafula, 1997).

A presentation at a road safety seminar in Uganda covered the medical issues of road casualties. Mulago Hospital in Kampala, reported road crash victims accounting for 20-25 per cent of its surgical emergency admissions in 1995, when a total of 2087 road casualties were treated in the hospital's Accident and Emergency Department. The casualty's condition is worsened by the lack of pre-hospital care in Uganda, with most casualties being transported to the hospital via "Good Samaritans". Alcohol intoxication was believed to play a major role in road injury with the then legal blood alcohol limit of 150 mg/dl (Aidria-Ezati, 1996)

Regional collaboration has begun on injury control and prevention. The Third International Conference on Injury Prevention and Control in Melbourne (1996) included a round table session on injury control in Africa. The objectives were the development of strategies for increased government and international donor community support for injury control. Recommended strategies included

- Linking injuries with other societal problems, such as economic losses
- Developing interest groups and coalitions, involving, for instance, the families of injury victims (Forjuoh and Mock, 1998)

14 ALCOHOL/DRUGS AND THE ROAD USER

While many countries report a problem with impaired road use due to alcohol and/or drugs, the response has been varied and in general, poorly documented. Few references were found pertaining to an area which has been a major priority area for HICs in the past few decades.

While drink driving (and walking under the influence of alcohol) is accepted as a major problem in many countries, relatively little research appears to have been conducted, possibly due to the difficulty and cost of testing. Blood tests are the most common method used but these involve an invasive procedure and complicated testing procedures as well. While breathalysers have been the standard method in developed countries for the past few decades, they are still regarded with suspicion in many countries.

In Eldoret, Kenya, research was conducted to document the reliability of breathalysers in local conditions (Odero et al, 1999). In early 1995, a six month survey in local hospitals was conducted in which the breathalyser results of trauma-affected adults were compared with the findings from blood tests. The sample was restricted to injured adults attending the emergency room within 10 hours of the injury. Of a total of 2073 trauma casualties were attended, of

which 41 per cent came after more than 10 hours time from the injury. Another 20 per cent were unable or refused to be tested. A total of 778 were breathalysed but of these, only 179 also had a blood sample taken.

Breathalysers were found to provide reliable and valid estimates of actual blood alcohol concentrations at levels equal to or greater than 50 millilitres of blood. At this level, nearly all false positives were eliminated. The need for proper training and clear instructions in the use of Alcolmeters was also stressed by the study. Breathalysers hold much potential as a low cost measure for assessing blood alcohol concentration, even at roadside locations.

The Drug Recognition methodology developed by the Los Angeles Police Department and now used throughout the USA, has been introduced to South Africa. This involved a collaboration between the Departments of Justice, Health and Transport, as well as CSIR, the Medical Research Council and the Human Sciences Research Council. The South African Road Accident Fund has provided funding for anti-drug road safety strategies (van der Spuy, 1997).

Botswana reported a 59 per cent decline in road deaths caused by drunken driving with 12 fatalities in 1997 compared to 27 the year before. Publicity and enforcement campaigns, especially the use of the breathalysers, were credited with contributing to the improvement (Department of Road Transport and Safety, 1997).

14.1 South Africa and Impaired Road Use

Alcohol and the injured driver: the PODDER-project conducted at the Grootte Schuur Hospital trauma unit

The objectives of the study were to determine, inter alia, the profile of the injured driver in terms of his demographic and socio-economic status, the interaction with law enforcement agencies, collision-related factors such as weather conditions, driving experiences, time of day and day of week (Kralingen, WN, Feb-91).

15 CRASH COSTING

This section reviews the extent to which the cumulative costs of road traffic crashes are currently appreciated in Africa.

15.1 National estimates

At the last African Road Safety Conference, RTCs were estimated at costing 2 per cent of a country's GNP (Dhilweyo, 1997). In the late 1980s, the Southern African Transport and Communications Council (SATCC) estimated RTCs to cost between 1.8-2.6 per cent GNP in the region. The 2 per cent estimate is being used by Nigeria (Osagie et al, 1998) while in Zambia, a 1990 TOI study estimated RTCs at 2.3 per cent GNP. The Botswana Road Safety Improvement Programme adopted South African values and estimated the 1994 national cost at P275M, 2.7 per cent GDP (Davey, 1996) yet the 1997 cost estimate for RTCs in South Africa was almost 13 billion Rand, 1 per cent GNP (Robot, Winter 1999). A recent study in Ethiopia estimated the RTC costs to be 0.8-0.9 per cent of GNP

High costing estimates have also been found with the Road Safety Unit in the Ministry of Public Works in Kenya valuing the cost of road accidents at 5 per cent country's GNP (Odero, 1997). KwaZulu-Natal estimates the consequences of road collisions to cost 4.5 per cent of the Province's Gross Domestic Product (KwaZulu-Natal Road Traffic Inspectorate, 1995).

All countries used the gross output method but several included a component for the human costs, i.e. pain, grief and suffering (PGS). In Tanzania (1994) the resource costs of accidents were calculated from data from medical, insurance sector, police and planning commission.

No addition was made for PGS and these costs were described as “preliminary” with vehicle damage estimated at 5 per cent of the value of the colliding vehicle. The resource costs were offered as a conservative estimate (11 billion TAS) with the actual costs assumed to be closer to 15-20 billion TAS (Tanzania MOW, 1996).

Until 1991, South Africa did not include a human cost component and it is still only a small amount based on actual compensation by the Road Accident Fund and only allocated to injuries (Schutte, 1999).

The Ethiopian costing was a desk exercise, which used different approaches to estimate the current RTC cost (Ethiopia Road Safety Study Survey Report, 1999). It was the only reference found which addressed the problem of under-reporting. The total cost to the country was calculated to include the cost of RTCs not reported to the police.

15.1.1 Average accident costs

The level of details provided on the costings varied considerably and only a few provided average accident costs. The Road Safety Improvement Programme in Malawi estimated accident costs in 1992 for the four different severities, i.e. fatal, serious, slight, damage only. (De Leuw Cather, 1992). These categories were used by the costings in Ethiopia and South Africa, and a comparison of the relative weightings is shown in the table below.

Table 14.1 Average crash costs

	Malawi (1992)		South Africa (1997)		Ethiopia (1999)	
	Kwachi	Ratio	Rand	ratio	Birr	Ratio
Fatal	226,887	8.5	318,485,237	18.9	49,500	15.0
Serious	88,428	3.3	83,568,238	5.0	22,000	6.7
Slight	53,377	2.0	23,801,641	1.4	7,600	2.3
Damage only	26,703	1.0	16,825,933	1	3,300	1

Sources: De Leuw Cather, 1992, ROBOT 1999, TRL 1999

15.1.2 Medical costs

Medical costs account for only a small portion of total crash costs yet RTCs are a serious drain on the limited medical resources available in Africa. The burden on the Kenya health care services from RTC included 2 per cent of all hospital attendances, 5 per cent admissions, 39 per cent trauma related admissions and 44 per cent of all trauma related bed days due to road casualties. RTC injuries resulted in a average length of inpatient stay over twice that of violence, the other main cause of trauma (Odero, 1998). In South Africa, one study found that only 5.5% of related costs were recovered from patients (MRC Policy Brief, 1998).

RTC is a major cause of disability with three quarters of all patients admitted to the National Spinal Injury Hospital in Nairobi due to RTCs (Odero/Holst, 1998).

15.1.3 Socio-economic costs

A research project funded by DFID a few years back investigated the socio-economic impact of RTCs in Fiji, Ghana, Indonesia, Peru, Swaziland and Zimbabwe through hospital and insurance claim surveys. Most victims were married and living with between 9-46 per cent being the sole earner for the family. In Bangladesh, only one of every six victims surveyed did not have any dependants RTC victims were reported to have a higher median income than the national average but this may reflect the hospital based nature of the surveys (Ghee et al, 1997).

In keeping with its poverty elimination objective, DFID has continued to fund research into the impacts of RTCs as they are assumed to affect the vulnerable of society. A scoping study was recently undertaken which reviewed the current weaknesses of crash costing in developing countries and proposed a new methodology to be piloted in several countries (Ross Silcock, 2000). The case studies have been agreed to include Bangladesh, South Africa, India (Bangalore) and Ghana and are due to start in late 2000. A wider approach has been proposed which, in contrast to the traditional methodology which focuses on the casualty, investigates the impact on the family as they must bear the burden of care and adjust to the reduced household income available. Multiple methods of collecting lost output and vehicle damage costs have also been proposed for comparison purposes.

15.1.4 Application

The economic analysis of a road safety project was discussed in the Malawi Road Safety Improvement Manual (Draft 1992), which contained practical examples of how to undertake a benefit cost analysis for safety measures.

The Tanzania Road Safety Programme Report (1996) included a chapter on the costs and other consequences of RTC. The objective was to derive a rational estimate of an annual road safety budget. A programme costing up to 1 billion shillings annually (about 5 per cent of the annual loss) was proposed. Assuming the recent accident reduction could be attributed to the programme, the savings from an a 1 per cent reduction in accident growth meant the cost of the DNTC Road Safety Division and the Police Capital would have been recouped in less than 2 years (Davey, 1996).

The ongoing Ethiopian Road Safety Study has used accident costs to highlight the small amount of funding being proposed for road safety improvements. Accident costs are being estimated at approximately twice the Road Fund annual earnings yet only 1-2 per cent of the Road Fund was being discussed for road safety investment (TRL, 1999)

15.2 South African Costing

South Africa has been researching crash costs for over the past three decades, with the first national estimate of RTC costs published in 1965. There have been 13 subsequent reviews of RTC costs, which are updated on an annual basis. CSIR have recently reviewed the methodology and are in the process of revising accident costs. RTC costs have been used to estimate the benefits of the ongoing Drive Alive national road safety campaign.

The references listed below are recent CSIR publications.

Validation of routine for determining travel time and road accident cost

According to the CEAS manual, the value of time or human life is a function of income per capita or income per worker. In this report the values for income given in the CEAS manual are compared with values obtained from roadside surveys. Also, the need to consider through traffic is considered. Finally, the implications of classifying vehicle occupants into three groups are indicated. It is concluded, inter alia, that current thinking on the valuation of time and human lives may not be acceptable future decision makers (Schutte, IC, Mar-94).

The results of a pilot study to estimate the social value of road accident reduction for the purposes of CBA

The usual method for estimating the benefits of reducing the incidence of road accidents for the purpose of cost benefit analysis is to calculate the saving in accident costs. In this report, it is explained that the social value of accident reduction is really determined by the willingness of society to pay for safer roads. The results of a pilot survey which establishes this willingness are described, although it is evident that motorists consider existing taxation

sufficient to afford such roads. A more comprehensive survey is recommended (Greenwood, PD, Oct-89).

The value of life according to the willingness-to-pay approach

The report contains the results of a survey to determine the willingness of individuals to contribute to improved road safety (Morden, CH, Mar-91).

Methodology for the determination of the unit cost of road traffic collisions in South Africa as an input into economic evaluation

This report reviews 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 state-of-the-art of collision cost estimation internationally (Schutte, IC, Mar-99).

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

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 (Schutte, IC, Mar-00).

APPENDIX D CONTACT DATABASE

As outlined in the terms of reference, a database of contacts throughout Sub Saharan has been provided by the research team and is given in appendix 4. Of the 42 countries included in the study, information is provided on 41 the exception being Somalia.

A decision was taken to restrict the number of contacts in each country to a maximum of 10 or so. In some countries many more could have been provided (Ghana, Zimbabwe, South Africa for example), whereas in other countries it was difficult to find more than two or three organisations or people with a specific interest in road safety. Where it was possible to be selective, efforts were made to provide the names of contacts with different disciplines or responsibilities. In particular, efforts were made in each country to provide the name of a senior person within a government department (usually the Ministry of Transport or communications) with responsibility for the administration of road safety, a senior police officer, a researcher, (either within a University or a government research centre) and a senior highway engineer.

Information was obtained from a number of sources as follows:

1. TRL's database of contacts throughout the developing world. This has been built up over many years and contains information on about 4,000 people and organisations. Of these about 1,000 are based in Africa. Contacts indicate their areas of interest (for example, urban transport, road safety, highway engineering, geoscience etc) and about 40 per cent of all contacts indicate an interest in road safety. This has been used extensively to provide the database given in appendix D.
2. Another important source of information was obtained from the United Nation Economic Commission for Africa (UNECA). Senior staff at UNECA, based in Addis Ababa advise and assist member countries on a wide range of transport related issues and information provided by Dr Ernest Dhliwayo has been particularly useful.
3. Members of TRL's International Division are currently working (or have been working) in a number of African countries, particularly Ghana, Zimbabwe, Cameroon, Botswana, Zambia, Ethiopia, Burkina Faso, South Africa, etc. Names of people involved in projects where TRL have played a role have been provided and incorporated into the database.
4. Finally, the organisation Solidarite Internationale sur les Transports et la Recherche en Afrique Sub-Saharienne (SITRASS), based in France has produced an extremely useful booklet of names of people interested in transport research in Africa. This contains information on about 400 contacts/organisations interested in transport research in general. Of these, 42 expressed a specific interest in road safety but of these 7 were based in France, UK or USA. The names of the remaining 35 or so people have been incorporated into the database.

Wherever possible, the actual names of people as well as their position have been provided. Thus if the staff of the Federal Highway Administration (FHWA) or National Highway Traffic Safety Administration (NHTSA) wish to make contact with a particular organisation, they can avoid an impersonal approach by contacting a named person. That said, it should be borne in mind that people change position or retire and a turnover of people concerned with road safety in a particular country is inevitable.

Some countries have been particularly active on road safety studies in recent years. For example they may have been in close liaison with World Bank staff and in receipt of highway sector or urban project loans. Such loans (or possibly grants) usually contain a road safety component. Other countries may be in close contact with research organisations such as TRL (UK), INRETS (France) or possibly CSIR (South Africa). The co-operative research undertaken in collaboration with such organisations is generally presented at international conferences, etc. Countries which seem to have been particularly active in road safety over recent years include:

- Ghana
- Ethiopia
- Tanzania
- South Africa
- Botswana
- Zimbabwe
- Zambia

From the point of view of FHWA or NHTSA collaboration on joint road safety research activities, etc, in Sub Sahara Africa, it would probably be advantageous to select countries from the above list, where useful work has already been undertaken.

Another important point to consider is that of the availability of road crash data. TRL has spent many years developing a micro-computer-based system for the collection, storage and analysis of crash data for use in developing countries. The system called the Microcomputer Accident Analysis Package, (MAAP) now available in a Windows version, has been introduced into a number of African countries, in most, on a trial or regional basis but in some, it operates as the official national system. In countries where MAAP is available, (which includes most of those listed above), the quality of data, (essential for research and accident analysis purposes) will be much better than in those countries which have not adopted it either wholly or in part.

A few major countries are perhaps conspicuous by their absence on the above lists and Nigeria and Kenya come readily to mind. Nigeria has the second highest number of road deaths in Africa (see section 4), yet as far as the authors of this report are aware, little national or international road safety activity has taken place in recent years. Much of TRL's early work on road safety in developing countries was carried out in Kenya with excellent support provided by the Kenya traffic police, the Nairobi Municipality etc. This was followed in the late 1970's by a lengthy study funded by the government of Finland. Since then relatively little road safety activity has taken place.

Finally, if FHWA and NHTSA are interested in supporting more road safety activity in Africa, thought should perhaps be given to setting up co-operative studies with international bodies active on the Continent. These include the World Bank, the UNECA and the African Development Bank. World Bank recently assisted in establishing the Global Road Safety Partnership (GRSP) under the framework of its Business Partners for Development Programme. GRSP is a partnership of private sector, civil society and government organisations collaborating to improve the road safety situation around the world. NHTSA is already represented (through Julie Abraham) on the GRSP Committee.

The UNECA have, for many years supported road safety activity in Africa, producing for example, with TRL support, a manual (in French and English) for drivers of heavy goods vehicles. Over the last ten years thousands of copies of this manual have been distributed

throughout Africa. Similar manuals covering other aspects of road safety are clearly needed. Key contacts currently at the UNECA are:

Mamadou Hachim Koumare
Senior Economic Affairs Officer
Regional Co-operation and Integration Division
United Nations Economic Commission for Africa
P.O. Box 3005
Addis Ababa
Ethiopia

and also Marie Therese Guiebo at the same address.

Another important contact within UNECA is Dr Ernest Dhliwayo formally based in Addis Ababa but now at :

UNECA
(SRDC-SA)
P.O. Box 30647
Lusaka
Zambia

The African Development Bank (AfDB) unlike the World Bank and the Asian Development Bank has relatively little involvement in road safety over the last ten years or so. However the AfDB is now showing some interest in road safety and Mr Nnama is on the GRSP Committee.

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