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GLOBAL
ROAD SAFETY
PARTNERSHIP

Estimating global road fatalities

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This report is dedicated to the memory of Angela Astrop who sadly died in December 1999, just as this report was being finalised. She will be missed by her many friends and colleagues at TRL.

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Executive Summary

In recent years, major studies published by the World Health Organisation, TRL and others have identified the growing importance of road crashes as a cause of death, particularly in developing and transitional countries. This growing awareness of the problem is reflected in the recent establishment of the Global Road Safety Partnership (GRSP), an association of private sector, civil society and government organisations collaborating together to improve the road safety situation worldwide

In order to provide the GRSP with an update of the road safety problem worldwide, a study was undertaken by TRL with the following objectives:

- To derive an estimate of road crash fatalities worldwide and on a regional basis.
- To provide an estimate of crash costs worldwide in relation to Gross National Product (GNP).
- To obtain regional analyses of fatality trends.
- To identify current fatality rates and risk (deaths per 10,000 vehicles and per 100,000 population respectively) and also casualty trends by age, sex and road user type.

The methodology undertaken was based on official reported road fatalities, i.e. police databases, but adjusted to accommodate the following 1) countries without any published road fatality statistics, 2) updating reported road fatalities to the current year (1999), and 3) under-reporting. The latter included two different problems: under-recording, i.e. casualties reported to the police but omitted from official statistics, and non-reporting, i.e fatalities which were never reported to the police. The extent and impact of under-reporting, especially in developing countries, was highlighted with documented examples.

The study estimated that in 1999 between 750,000 and 880,000 people died from road crashes and that the majority of these deaths occurred in developing and transitional nations (85 per cent). Almost half of all estimated deaths occurred in the Asia-Pacific region. This compares with a recent estimate by the World Health Organisation of over a million deaths in 1998. Study findings also indicate that over the next ten to twenty years the number of people dying annually in road crashes may rise to 1 million to 1.3 million respectively.

Estimates suggest that 23-34 million people are injured worldwide in road crashes—a value almost twice that previously estimated. The problem of injury under-reporting is perceived to be even more serious with a fraction of injury road crashes being reported in many less motorised countries.

Trend data showed that the total number of people killed in road crashes in regions of the developing world continued to increase, whereas in the West there has been a steady decrease over the last fifteen years or so. For example, between 1987-1995 deaths in the Asia-Pacific rose by 40 per cent, in Africa by 26 per cent (excluding South Africa where the increase was minimal) and the Middle East/North Africa region by over 36 per cent. Road deaths doubled in a few Latin America countries and rose by 16 per cent in Brazil. Central and Eastern Europe showed wide variation with fatalities increasing by 31 per cent in Poland but decreasing in other countries by up to 36 per cent. Conversely road deaths in highly motorised countries fell by about 10 per cent.

Growth rates are sensitive to the time period selected and analysis method used but the general trends show global road fatalities increasing at a slower rate in the next two decades. Based on trend series data from a limited number of countries (43), the increase in fatalities in Africa and Latin America is expected to continue to increase for a few more years before slowing down while the fatality growth in Asia and the Middle East is slowing down. The decrease in fatalities in the West is expected to continue but at a slower rate.

A review was undertaken of those countries which have attempted to cost road crashes. It was found that as a percentage of GNP, costs ranged from as low as 0.3 per cent to over 4 per cent. In order to obtain an estimate of cost worldwide, a broad (and albeit crude) assumption was made that in developing countries the annual cost of road crashes is about 1 per cent of GNP (a value used for many years based on early research in this topic), in transitional countries about 1.5 per cent and developed countries 2 per cent. Estimates were derived of what this meant in global and regional terms and it was found that in 1998, global costs (using the above assumptions) might have been of the order of US$500 billion and in developing and transitional countries about US$60 billion.

Results show that the highest fatality rates (deaths per 10,000 motor vehicles) worldwide occur in African countries, particularly Ethiopia, Uganda and Malawi whilst fatality risk (deaths/100,000 population) is highest in a disparate group of countries including Thailand, Malaysia, South Africa and Saudi Arabia.

As might be expected, males in the most economically active age group make up the largest proportion of reported victims of road crashes. Previous studies have found that children in developing countries tend to be more at risk than in the developed world. However, they account for a relatively small percent of reported road crash casualties.

Women's fatality involvement appears to increase with motorisation. It should be noted that while women in less motorised countries may currently have a low accident risk, research indicates that the crash consequences can be more severe for women as there is often less investment in their medical treatment and recovery. Furthermore, their legal status as widows is often very unfavourable and the loss of a husband can mean the break up of a family.

It should also be emphasised that vulnerable road users, i.e. pedestrians and two wheelers (motorcyclists and bicyclists), but especially pedestrians, are a particularly high-risk group throughout Africa and Asia as well as the Middle East. Car occupant casualties dominate in the highly motorised countries and are much more common in

the Latin America/Caribbean region. Finally the report identifies weaknesses in the quality of existing data, particularly from developing countries and highlights areas that could be examined within the GRSP programme so that a greater understanding of the global road crash situation can be obtained.

1 Introduction

1.1 Background

The problem of deaths and injury as a result of road crashes[1] is now acknowledged to be a global phenomenon with authorities in virtually all countries of the world concerned about the growth in the number of people killed and seriously injured on their roads. In recent years there have been two major studies of causes of death worldwide which have been published in the 'Global Burden of Disease' (1996, World Health Organisation, World Bank and Harvard University) and in the 'World Health Report – Making a Difference' (WHO 1999).

These publications show that in 1990 road crashes as a cause of death or disability were by no means insignificant, lying in ninth place out of a total of over 100 separately identified causes. However, by the year 2020 forecasts suggest that as a cause of death, road crashes will move up to sixth place and in terms of years of life lost (YLL) and 'disability-adjusted life years' (DALYs)[2] will be in second and third place respectively.

This growing awareness is reflected in the recent establishment of the Global Road Safety Partnership (GRSP). Under the framework of the World Bank's Business Partners for Development (BPD) Programme, GRSP is a partnership of private sector, civil society and government organisations collaborating to improve the road safety situation around the world. A Steering Committee for GRSP is now in place with the aim of creating a global information network that aims to produce solid evidence of the positive impact of partnerships – both the development impact and the business benefits. Two important aspects of GRSP are the involvement of the private sector in promoting road safety and the promotion of greater awareness of road safety worldwide.

With the setting up of the GRSP it was considered important that a comprehensive summary of the global situation was made available to all involved in the problem of road crashes in developing and transitional nations. For example, using published statistics from countries throughout the world, TRL has in the past attempted to identify the number of people killed in road crashes worldwide and also on a regional basis. The last attempt to do this however used 1990 data and is clearly out of date (Ghee et al 1996). Further, since that time, more information has been collected on under-reporting and a better estimate can be obtained of the global situation. Using different statistics, the World Health Organisation (WHO) investigated deaths from many causes in the two above studies. Differences exist in these early estimates provided by TRL and WHO, and the GRSP Steering Committee proposed that a review should be undertaken to resolve these differences and identify the current situation as accurately as possible. It was agreed that the World Bank, the Department for International Development UK (DFID) and TRL would co-fund a study which would be restricted to the analysis of published material.

The study was carried out by TRL with the following objectives:

- To derive an estimate of road crash fatalities worldwide and on a regional basis for the year 1999 and to derive forecasts of the likely number of deaths in the year 2010 and 2020.
- To provide an estimate of crash costs worldwide in relation to GNP.
- To obtain regional analyses of fatality trends, rates and risk (deaths per 10,000 vehicles and per 100,000 population respectively) and casualty trends by age, sex and road user type.

The main sources of data used for this study were the International Road Federation (IRF) annual statistical yearbooks, World Health Organisation (WHO) publications, recent regional and country studies, such as the Asian Development Bank (ADB) funded Road Safety in Asia/Pacific, the Inter American Development Bank financed Latin America Study and the European Commission PHARE Multi-Country Transport Programme. Road casualty data also came from TRL publications and country studies.

2 Estimating global road fatalities

Previous reviews of global fatalities undertaken by TRL, World Bank and others have produced a wide range of estimates and whilst the problem of data reliability and under-reporting has been regularly acknowledged, traditional reliance has been on the use of officially published statistics based on police reports.

In estimating causes of death and disability, the World Health Organisation (WHO) used a different method, based on registered deaths and health sector data, that produced higher estimates than those using official police statistics. For example, WHO estimated a million deaths worldwide in 1990 whilst the TRL values were of the order of half this. Using their 1990 figure, WHO then estimated deaths in 1998 to be 1.17 million worldwide.

2.1 Methodology

In keeping with the traditional approach used by transport specialists in compiling road crash statistics, the starting point in this current study was the official fatality figure reported by countries. Using these values to obtain an accurate estimate of the current global fatality situation required several factors to be taken into account as follows:

1 Updating the fatality figure from the latest year (usually 1995/96) to 1999.

[1] *Over the past decade, the term 'crash' has been increasingly used to replace the term 'accident' with motor collisions. Crash is already commonly used in the transport sector to describe air and rail disasters and avoids any misleading connotations of 'unavoidable'.*

[2] *DALY's express years of life lost to premature death and also years lived with a disability, adjusted for the severity of the disability.*

2 Estimating for those countries where fatality data was not obtained.

3 Under-reporting.

   a recording deficiencies

   b non-reporting to the police

The general problem of under-reporting includes both recording deficiencies, i.e 'under recording' where casualties are reported to the police but are not included in the published statistics, and non-reporting where the police are not notified of road casualties. To highlight the extent of under-reporting, the problems of recording deficiencies and non-reporting have been discussed separately in this study.

2.1.1 Regional classifications

There is no standard approach to regional groupings used by the many different international organisations concerned with road safety. However, in order to aid interpretation of data, a total of 192 countries were assigned to six major regional groups as follows:

- Africa.
- Asia/Pacific.
- Central and Eastern Europe (CEE).
- Latin/Central America and the Caribbean (LAC).
- Middle East and North Africa (MENA).
- Highly motorised countries (HMC), i.e. North America, Australia, New Zealand, Japan and Western Europe.

Less motorised countries (LMC) is the collective term used to describe the first five regions where motorisation is typically much lower than in the industrialised HMCs.

2.2 1998 updates

Most countries had published road fatality data available for 1996 and so the first step involved updating to the current year of 1999. Figure 1 shows the recent fatality trends from the different regions and the global level. While the CEE region reported fatalities peaking in 1990 before dropping, the reverse was reported in the LAC region with fatalities increasing in recent years.

After investigating the series data available for the larger countries within each region (see Table 1), it became apparent that the use of a regional average growth rate could produce misleading predictions because the figures would be biased by some countries.

Table 1 Countries with time series data

Region	*Countries*
HMC	Canada, France, Germany, Greece, Italy, Japan, Portugal, Spain, United Kingdom, United States
Africa	Ethiopia, Kenya, Malawi, Nigeria, Tanzania, Zambia, South Africa
Asia-Pacific	China, India, Indonesia, Korea Rep., Malaysia, Pakistan, Taiwan, Thailand, Turkey, Vietnam
CEE	Azerbijan, Bulgaria, Croatia, Lithuania, Poland
LAC	Brazil, Chile, Colombia, Ecuador, Uruguay
MENA	Bahrain, Cyprus, Morocco, Saudi Arabia, Syria, Yemen

Figure 1 shows recent regional fatality trends but as noted above, these will be heavily influenced by countries with relatively large numbers of fatalities for that region. The regional descriptions presented in Chapter 4 separate the large countries for this reason.

For example it was found within the MENA region, that fatality statistics from Morocco and Saudi Arabia were three times those elsewhere in the region causing statistics from other countries to be 'lost in their noise'. However, examination of data from the other countries indicated significantly different trends from those in Morocco and Saudi Arabia.

Similar, though less extreme results, were found in data from other regions. For example, the rapid growth in crashes observed in India and China, which already have large number of fatalities, highly influenced any attempt to form a regression over all countries in their region.

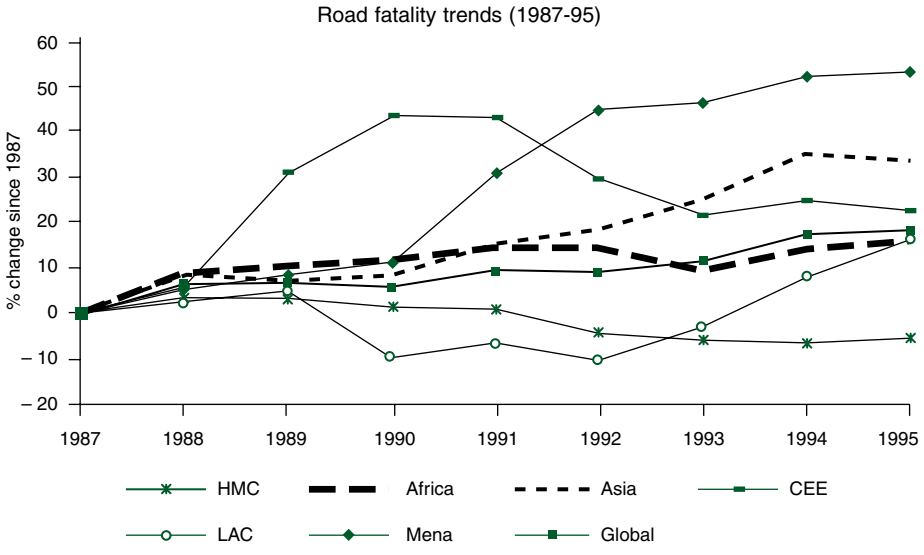

Figure 1 Regional fatality trends

A more accurate model was developed by sub-dividing each of the regions into two or three groups (see Table 2). Group 1 contained those countries with large number of road fatalities which dominated the region, all of which tended to have the same trends. Another group was formed from the other countries with fewer road fatalities. In some cases a third group was necessary, when trends between countries were significantly different. The details of the groups are shown above in Table 2.

Regression equations were fitted to the total number of road fatalities in each region, and separate regressions were fitted for each group in each region. Linear regression was used unless a strongly non-linear relationship was in evidence. In other cases LOGIT and quadratic equations were fitted.

The estimates shown in Table 3 are the values produced by the various equations for those countries with trend data. Where trend data was unavailable, the most conservative equation was applied within the region save for LAC and CEE where this would produce unrealistic fatality decreases (based on practical experience).

2.3 Non-reporting by countries

Despite a review that included many sources, road crash data could not be found for many countries in Africa and MENA (see Table 4). Africa had the lowest rate of representation and where data was available, it was often several years out of date.

While representation by motor vehicles might have been more suitable, many countries did not report the size of their motor vehicle fleet so this option was not possible. Accordingly, the number of reported road crash fatalities for the region was adjusted upwards according to the ratio of regional population as follows:

$$\text{Population adjustment} = \text{reported fatalities by region} \times \frac{\text{Total regional population}}{\text{Population of countries w/fatality data}}$$

The population adjustment formula shown above assumes a consistent fatality risk, i.e. road fatalities per 100,000 population, within the region, yet as seen in the

Table 2 Groupings used in the regions

Region	*Group 1 (High fatality toll)*	*Group 2 (Low fatality toll)*	*Group 3 (different trend)*
HMC	USA	All others	
Africa	Nigeria, South Africa	Ethiopia, Malawi, Tanzania, Zambia,	Kenya
Asia-Pacific	China, India	Indonesia, Korea Rep., Malaysia, Pakistan, Taiwan, Turkey, Vietnam	Thailand
CEE	Poland	Azerbijan, Bulgaria, Croatia, Lithuania	
LAC	Brazil	Chile, Ecuador, Uruguay	Colombia
Middle East	Morocco, Saudi Arabia	Bahrain, Cyprus	Syria, Yemen

Table 3 1999 minimum estimates for countries with fatality data

	1996 reported	*1999 estimated*
HMC	100,116	98,822
Africa	38,492	40,769
Central-Eastern Europe*	58,612	60,051
Asia-Pacific	204,379	226,663
Latin/Central America & Caribbean).	58,484	61,318
Middle East	20,225	25,462
Global	480,308	513,085

**Higher regional growth rate applied*

Table 4 Regional groups and crash data (1996)

	Regional totals		*With fatality data*			
	Countries	*Pop. ('000)*	*Countries*	*Percent*	*Pop. ('000)*	*Percent*
HMC	27	828,175	24	89%	828,278	100%
Africa	49	633,545	29	57%	449,540	71%
CEE	27	410,348	25	93%	382,522	93%
Asia-Pacific	38	3,085,628	26	68%	3,062,094	99%
LAC	34	482,050	25	74%	454,914	94%
MENA	18	250,818	13	72%	242734	88%
Global	193	5,690,564	142	74%	5,420,082	95%

regional summaries in Chapter 4, this is not always the case. As those countries not reporting road crash data tend to be the less developed, an adjustment based on population may overinflate to a small extent the regional fatality estimate.

As shown in Table 5, Africa was the only region where a large adjustment had to be made to adjust for those countries where published fatality figures could not be found. Overall, the global reported figure had to be adjusted by approximately 6 per cent to accommodate those countries where fatality data was not obtained.

Table 5 1999 global reported fatality estimate

	1999 estimated reported fatalities	*Addition for non-reporting*	*Total*
HMC	98,822	12	98,834
Africa	41,371	16,948	58,319
Central-Eastern Europe	60,051	3,489	63,540
Asia-Pacific	226,663	1,742	228,405
Latin/Central America & Caribbean	61,318	3,382	64,700
Middle East/North Africa	25,462	3,403	28,865
Global	513,085	28,976	542,663

2.4 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. There are three main causes of under-recording:

- Fatality definition.
- Road crash definition.
- Database updating procedures.

2.4.1 Fatality definition

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). As shown in the Appendix, 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 are shown in the Table 6.

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). Despite this, it was assumed that the ECMT values would not apply for all LMCs; a larger percentage of road crash fatalities can, unfortunately, be expected to die within the first day with the lack of advanced medical facilities as well as the higher percentage of vulnerable road user fatalities.

Table 6 ECMT standardised 30 day road crash fatality adjustment factors

	30 day total	*Adjustment factor*
Scene/1 day	77%	1.30
3 days	87%	1.15
6 days	92%	1.09
7 days	93%	1.08
30 days	100%	1.00
365 days	103%	0.97

Given the lack of information on the timing of LMC road crash deaths, the assumption was made to use half the ECMT values for LMCs. Thus those LMCs 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. This approach avoids any overestimate of deaths.

A second assumption was made regarding the standardised death definitions in LMCs; 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 LMC 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 LMC and thus a 15% inflation factor was logically applied to all LMC reported fatalities.

2.4.2 Road crash definition

According to the Vienna Convention, the standard international definition of an injury road crash involves a collision of a moving vehicle on a public road in which a road user (human or animal), is injured (IRTAD, 1992). Some countries, however, require the involvement of a motor vehicle and others exclude certain types of crashes. For instance, China’s reporting policy excludes road crashes occurring at roadworks or rail crossings, a restriction which is believed to exclude thousands of deaths which are reported by the health authorities as road fatalities. Likewise, Mexico’s official statistics refer only to deaths on the Federal road network and only account for 30 per cent of those reported by the national health authorities (ADB, 1998, WHO 1996). Other countries reported incomplete crash data sets with fatalities limited to urban areas (Madagascar) or for less than a full year (Benin).

2.4.3 Updating procedures

Updating and transferring records is a process prone to errors, especially when manual systems are involved, as so often is the case in LMCs. An early under-reporting study in Colombo, Sri Lanka found that while just over a half (53%) of the adult fatalities had been recorded by the hospital police post, when records were matched with the official police database, only 41 per cent were found to be included (Sayer and Hitchcock, 1984). After the introduction of a

nationwide computerised crash reporting system, road fatalities in Bangladesh increased by 55 per cent. Until recently, Zimbabwe used to lose one month's data each year when the official annual database was compiled.

Even computerised crash database systems in HMCs can exclude fatalities if required details are not provided within the reporting deadline. In the UK, a crash must be reported within 30 days of its occurrence with all the required information for it to be entered onto the STATS 19 database. National centralisation policy will also affect the completeness of the database. For example, while the UK allows 6 months for the local police forces to provide their data to the national database, conversely France requires all road crashes of the preceding year to be reported by the end of January, a decision which is believed to result in some reported fatalities being excluded from the official national accident statistics.

The low priority given to accurate reporting of road crashes is also a contributory factor, with data collection often seen as only a paperwork exercise and with no real practical value. In many countries, road crashes are reported by the general and not the Traffic Police who could be expected to give the data collection more priority. This is partly because the general police, unlike most Traffic Police, work around the clock seven days a week.

Large inconsistencies in the LMC crash databases have been highlighted in previous studies (ADB 1996, WB 1998). Police may also be put under pressure to avoid documenting a worsening safety record. Such factors may explain how Indonesia could experience such a high rate of growth in motor vehicles in the past decade, i.e. almost 80 percent between 1986-95 while only reporting a 3 per cent rise in road fatalities.

It has not been possible to develop standard adjustment factors for the problems mentioned above of updating and crash definitions but these data weaknesses will be considered in the assumptions made for adjusting for under-reporting.

2.5 Non-reporting by general public

Almost all countries require road crashes to be reported to the police. The UK is unusual in that it does not have a unilateral requirement to report road crashes, even fatal ones, to the police; the parties involved are only legally required to exchange names and addresses. If this is not done, then the crash should be reported to the police. Despite this, police reported statistics are still used to assess the road safety situation in the UK. The other extreme in reporting is found in Bahrain, where vehicle damage is not allowed to be repaired without proof that the crash has been reported to the police.

2.5.1 HMCs

A 1991 review on under-reporting studies worldwide included studies from the UK, USA and Canada that reported complete coverage of road crash fatalities while in Germany 5-9 per cent of road crash fatalities were not reported to the police (James, 1991). A 1994 International Road Traffic and Crash Database (IRTAD) Special Report on the under-reporting of road traffic crashes quoted studies indicating a 3 percent level of fatality under-reporting in Spain and 2 percent in Switzerland. Research in Western Australia has also found that 5 per cent of road crash deaths were unknown to the police (Giles, 1994).

Table 7 shows a comparison of the official police reported fatalities with that reported by WHO based on death certificates. The under reporting adjustment factor is the amount required to be added to the police reported figure in order to arrive at the WHO figure. Whilst the adjustment factor was found to be low in the USA, a surprisingly high 26 per cent needed to be added to official police statistics in Italy.

Table 7 Road crash fatality comparisons

Country	*Year*	*Police*	*WHO*	*Under reporting adjustment factor*
USA	1994	40,716	41,427	2%
Italy	1993	6,645	8,356	26%

Source: WHO World Health Statistics (1996)

2.5.2 LMCs

WHO World Health Statistics (1996) included examples of much worse under-reporting of fatalities in LMCs, with for example only one out of every five medically reported road deaths being included in police statistics in the Philippines (see Table 8).

Table 8 Road crash fatality under-reporting estimates

Country	*Year*	*Police*	*WHO*	*Under reporting adjustment factor*
Brazil	1992	21,387	26,576	24%
Cuba	1995	1,499	2,011	34%
Ecuador	1995	1,112	1,806	62%
Philippines	1993	581	2,621	351%

Source: WHO World Health Statistics (1996)

Similarly, in Indonesia, insurance companies reported 15,080 road fatalities in 1995, some 37 per cent more than the police reported. The Department of Health in Taiwan reported 7,250 road deaths in 1995, some 130 per cent greater than that reported by the police (3,094) although police statistics are limited to those fatalities occurring within 24 hours of a crash (Lu, 1999).

Due partially to the restricted definition of a reportable road crash, the under-reporting in China appears to be very high, unfortunately so for the country with already the largest number of road fatalities in the world. The Beijing Research Institute of Traffic Engineering estimated the actual number of fatalities in China for 1994 to be 111,000, 42 per cent greater than the 77,860 reported officially by the police (Liren, 1996).

Despite the progress made by computerising the police

reporting system in Bangladesh, road casualty reporting is still incomplete. A review of the road trauma fatalities in the capital Dhaka in 1996-1997 found 30 percent of those road fatalities reported in the newspapers were not included in the police database (IDC, 1997).

In Karachi, a recent study compared the road crash casualties reported by the police with those treated by the main ambulance service. Using the capture-recapture method, the study estimated that only 56 percent of road crash fatalities had been reported by the police in Karachi in 1994 (Razzak, 1998).

Another recent urban review of fatality under-reporting was conducted in Bogota, Colombia. A comparison of the police reported fatalities with those on the city's mortuary database found major discrepancies. Only 27 per cent of the mortuary's road fatalities were found as fatalities on the police system (another 19 per cent were reported as injured). A further concern was that 19 per cent of the total fatalities were not found on the mortuary system so that even the (presumably) most reliable system is missing almost one fifth of all road fatalities (TRL, 1998).

2.5.3 Non-reporting adjustment factors

Evidence that under-reporting of fatalities ranged from 0-26 percent in HMCs and up to as high as 351 per cent in LMCs with fatalities in China estimated to be as high as 42 per cent more than officially reported. Accordingly, to adjust for the extent of non-reporting of fatalities, as well as the under-recording weaknesses that could not be easily quantified, the conservative but realistic decision was made to use the following factors:

- HMC 2-5 per cent adjustment
- LMC 25-50 per cent adjustment

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.

2.6 Current global fatality estimate

Based on the methodology described above, a realistic estimate of global road deaths is between 750,000 and 880,000 for the year 1999. The calculations and regional totals are presented in Table 9.

2.6.1 Comparison with WHO estimates

Whilst the fatality range presented here is lower than the recent WHO estimate, two points should be kept in mind. Firstly, the recent WHO estimates were based on the data synthesis conducted by the Global Burden of Disease (GBD) (1996). The ambitious objective of the project required major assumptions to be made, especially where data were absent. For example, it was reported that estimates for the entire region of sub-Saharan Africa were based only on South Africa which in turn represented only about 1 per cent of the region's population (Cooper et al, 1997).

Secondly, two different methods of projection were used by WHO. Information on most causes of death (inc. road crashes) were based on complex forecasting techniques (usually from a base year of 1990) whilst others such as malaria, HIV/AIDS, tuberculosis were based on regional information collected as part of detailed and specific studies of these diseases. Even so, considerable variation exists in the forecasts derived for leading causes of death. Thus, for Sub Saharan Africa, deaths in 1998 from HIV/AIDS was stated to be 1.83 million but with a possible range of 1.1 million to 2.4 million. Similarly in Africa, deaths from malaria are estimated to be in the range 758,000 to 1.3 million and global deaths from tuberculosis of 1.49 million actually lies in the range 1.1 to 2.2 million.

The higher estimate derived in this study is a third less than the WHO value of 1.18 million estimated for 1998. However, as previously stated, the WHO study is based on 1990 data, and a number of assumptions about the distribution of fatalities in 1998 are made (World Health Report 1999). This, as shown above, leads to a range of possible fatalities for different diseases. Therefore, presenting a range of possible fatalities is not incongruent with the method employed by the WHO.

2.6.2 Global road crash injury estimate

While the extent of under-reporting is known to be even worse with injuries than with fatalities, a minimum estimate within a likely range has been included here. Based on the IRTAD report mentioned previously and earlier studies that had estimated approximately 50 percent of road injuries were reported, a ratio of 100 injuries for every fatality was assumed to apply in the HMCs. For LMCs, a ratio of between 20 to 30 was accepted as a conservative estimate. These values produce annual road

Table 9 1999 Estimated road fatalities with under-reporting (UR) adjustments

		30 day fatality		*Low UR estimates*		*Upper UR estimates*	
	1999 estimate	*Adjustment factor*	*Estimate*	*Adjustment factor*	*Estimate*	*Adjustment factor*	*Estimate*
HMC	98,834	ECMT*	105,654	1.02	107,767	1.05	110,937
Africa	58,319	1.15	67,067	1.25	83,834	1.50	100,600
C/E Europe	63,540	1.15	73,071	1.25	91,339	1.50	109,607
Asia-Pacific	228,405	1.15	262,666	1.25	328,332	1.50	393,999
LAC	64,699	1.15	74,404	1.25	93,005	1.50	111,606
MENA	28,864	1.15	33,194	1.25	41,492	1.50	49,790
Global	542,661		616,056		745,769		876,539

**ECMT standard adjustment factors applied from Table 2.7*

crash injury estimates for 1999 of at least:

- 11 million in HMCs;
- 12 to 23 million in LMCs;
- global estimate of between 23 and 34 million road crash injuries per annum.

This estimate is approximately twice other current global road injury figures (GRSP, 1999). An estimate of the number or percent of injuries that are disabling was beyond the scope of this review.

2.7 Fatality forecasts

Forecasting future deaths worldwide is fraught with difficulties. For example, past trends may be thought to give a reasonable picture of what may happen in the future. However some countries, such as Japan experienced rapid deterioration in road safety in the 1960s with an 80 per cent growth in road fatalities but then with massive investment reduced deaths by almost 50 per cent over the next decade. However deaths started to increase once again in the early 1980s due in part to a continued increase in vehicle ownership but with a slowing down of investment in life-saving activities. Additionally, trends in many parts of the world are not consistent and there is evidence (see Section 4) that rapid increases of deaths in Africa and Asia/Pacific show signs of slowing down (that said growth rates in Africa and Asia are still high and of concern).

Social, political, and economic changes may also play a part and ideally would be taken into account in any forecasting activity. However, these changes are difficult to predict. For example, in the CEE region, changes in motor crash reporting most likely has changed with the transition to market economies. Whilst the trend in this region is one of fewer fatalities, it is probable that with economic development and rapid motorisation, there is potential for growth in the number of crashes and fatalities.

Forecasting future trends should be approached cautiously for the reasons outlined above. With these caveats in mind, we suggest that for 2010 the likely range of global road deaths will be between 900 thousand and 1.1 million and between 1 million and 1.3 million in 2020.

2.8 Summary

Based on officially reported fatalities, this study has attempted to produce a realistic estimate of global road crash deaths for the year 1999. Different recording definitions and procedures have been considered, as has the impact of under-reporting. One of the main objectives of this report was to document the estimation process and the data reliability. As the data has been shown to have many weaknesses, the estimate produced is considered to be realistic but conservative and the true toll could be higher.

The fatality estimate produced may be lower than the WHO figure but it still indicates that road crashes are a cause for concern. The burden of road fatalities is on the LMCs where 86 per cent of the world's road fatalities occur, with almost half of all fatalities in Asia. Figure 2 shows the regional distribution of 750,000 fatalities, the low end of the range suggested for 1999.

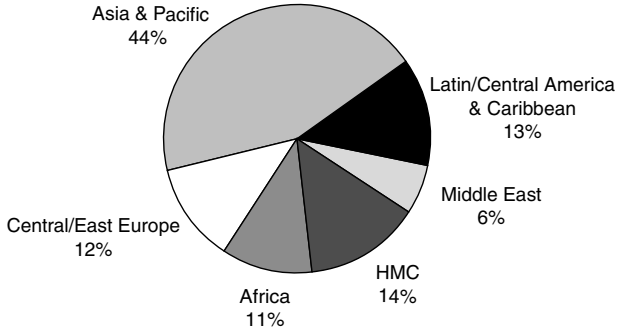

Figure 2 Estimated road fatality regional distribution (1999)

It should also be borne in mind that fatalities are only the tip of the casualty iceberg and that road safety, especially road safety engineering, is concerned with the reduction of injury road crashes. Worldwide, at least 30-45 people are being injured for every life lost. However, data on injuries and their social and economic impacts is very limited, and it is outside the scope of this study to present trends in injuries. It can reasonably be assumed that serious injuries have a major social and economic impact. Nationwide costs of road crashes (including those for injury accidents) are presented in the following chapter.

3 Economic costs of road crashes

3.1 Introduction

Apart from the humanitarian aspect of reducing road deaths and injuries in developing countries, a strong case can be made for reducing road crash deaths on economic grounds alone, as they consume massive financial resources that the countries can ill afford to lose. That said, it must of course be borne in mind that in developing and emerging nations, road safety is but one of the many problems demanding its share of funding and other resources. Even within the boundaries of the transport and highway sector, hard decisions have to be taken on the resources that a country can devote to road safety. In order to assist in this decision-making process it is essential that a method be devised to determine the cost of road crashes and the value of preventing them.

The first need for cost figures is at the level of national resource planning to ensure that road safety is ranked equitably in terms of investment in its improvement. Fairly broad estimates are usually sufficient for this purpose, but must be compatible with competing sectors. For example, in a recent road safety study undertaken in Mauritius, it was shown that the annual cost of road crashes nationally was about £20 million. A series of safety improvements were outlined, which, it is estimated would reduce the cost of crashes by 5 per cent per annum (i.e saving £1 million p.a.). These improvements (in highway design and layout, education, training and enforcement), were estimated to cost £500,000 in a programme of measures set over a five year period (i.e. at an average annual cost of £100,000). The average First Year Rate of Return on investment was therefore about 1000 per cent and the Benefit:Cost ratio

about 10:1. High rates of return such as these are fairly common in road safety appraisals and (apart from the humanitarian aspects), illustrate the economic benefits of investing in national road safety programmes.

A second need for road crash cost figures is to ensure that the best use is made of any investment and that the best (and most appropriate) safety improvements are introduced in terms of the benefits that they will generate in relation to the cost of their implementation. Failure to associate specific costs with road crashes will almost certainly result in the use of widely varying criteria in the choice of measures and the assessment of projects that affect road safety. As a consequence it is extremely unlikely that the pattern of expenditure on road safety will, in any sense be 'optimal' in terms of equity. In particular, if safety benefits are ignored in transport planning then there will inevitably be associated under-investment in road safety.

A study conducted almost a quarter of a century ago (Fouracre and Jacobs, 1977) estimated road crashes to cost on average 1 per cent of a country's gross national product (GNP). This figure has been used by many countries and international aid agencies to estimate the scale of costs incurred by road crashes but as countries have developed, a higher range, 1 to 3 per cent has been suggested by the World Bank and others for road crash costs.

Expressing crash costs as a percentage of GNP provides an albeit crude but useful approach to costing accidents, particularly on a global or regional basis. That said, there is no real substitute in individual countries to carrying out a detailed appraisal of national accident costs.

3.2 Methods available to cost road crashes

The cost of road crashes will be influenced by the valuation method used. In their papers on the cost of traffic accidents and evaluation of accident prevention in developing countries, Hills and Jones-Lee (1981, 1983) identified six different methods that have been proposed for placing a cost on road accidents. They made the point that the appropriate method to use in any particular context may depend upon the objective and priorities of those who intend to use the costs and values concerned.

The reasons for costing road accidents are most likely to be either the maximisation of national output or the pursuit of social welfare objectives (such as the minimisation of injury accidents or fatalities in relation to traffic). The only accident costings/valuation methods that appear to be directly relevant to these two objectives are:

a the 'gross output' or 'human capital' (HC) method (well suited to the objective of maximising the wealth of a country); and

b the 'willingness to pay' (WTP) method (especially for social welfare maximisation and for the use in cost-benefit analyses).

If accident costs and values are ultimately intended for use in conventional cost-benefit analyses in order to determine the most efficient way of allocating scarce financial resources, then the most appropriate method to use by far is the willingness to pay approach. However, Whilst this method has been adopted in countries such as UK, USA, New Zealand and Sweden, the difficulty of obtaining reliable empirical estimates has been considered.

It seems unlikely that reliable willingness-to-pay costs and values will be available for use in most Asian and African countries for some time. (Certainly until detailed studies of its use and application have been carried out in one or two countries). It was recommended that the gross output approach is used to cost road accidents in the countries of Africa and Asia. However, in order to try to capture some of the 'humane' considerations reflected in the willingness to pay approach, gross output values should be augmented by a further allowance for 'pain, grief and suffering' of those involved in road crashes. This, in fact was the approach employed in the UK prior to the recent adoption of the willingness to pay approach.

3.3 Results of crash costing procedures

A summary of results from a range of HMCs and LMCs is shown in Table 10. For a critique on costing road accidents, please see TRL Overseas Road Note 10.

A recent World Bank Working Paper on Road Traffic Safety in the Europe and Central Asia Region estimated crash costs per country on the basis of average EU crash costs. Costs were estimated according to their GNP per capita figure (i.e. if a country's GNP per capita was 1/10 that of the EU's then crash costs were assumed to be 1/10 average EU crast costs). Total costs were estimated on the basis of the number of reported fatalities and injuries with a standard casualty rate per crash. This approach estimated crash costs to range from 1.1 per cent (Georgia, Turkmenistan) to 3.3 per cent (Slovenia). The overall (unweighted) average was almost 2.0 per cent (Blomberg, 1999).

It should be noted that the valuations differ in their accommodation of un-reported crashes. For instance, the USA's estimate is for unreported crashes while in UK, unreported damage-only crashes are included but the valuation of injury crashes is limited to those reported to the police. The latter is believed to be the case for most costings in HMCs.

3.4 Summary

From the above table it can be seen that road crash costs, expressed as a percentage of GNP range from 0.3 per cent in Vietnam to almost 5 per cent in USA, Malawi and Kwa Zulu, Natal. Overall it does appear that in most countries, costs exceed 1 per cent of GNP which may now be considered to be an under-estimate of national accident costs. However, the figures also indicate that costs as a percentage of GNP may be lower in less developed countries and therefore caution should be exercised in moving from 1 per cent of GNP to a much higher level for developing countries.

The following table provides a crude estimate of global and regional costs assuming that the annual cost of road crashes is about 1 per cent in developing countries, 1.5 per cent in transitional countries, and 2 per cent in highly motorised countries.

Table 10 Recent estimates of economic costs of road crashes

Country	*Study year*	*Costing method*	*Percent GNP*	*Value US$mil (1997)*	*Source*
LAC					
Brazil	1997	HC	2.0%	15,681	IADB Review of Traffic Safety
Asia					
Vietnam	1998	HC	0.3%	72	Technical Note: Accident Costing
Bangladesh	1998	HC	0.5%	220	IDC Economics Working Paper Accident Costs
Thailand	1997	HC	2.3%	3,810	SWEROAD Road Safety Master Plan Report
Korea	1996	HC	2.6%	12,561	Elvik, 1999
Nepal	1996	HC	0.5%	24	Road Maintenance Component, TN Accident Costing 1996
Kerala, India	1993	HC	0.8%	—	Chand 'Cost of Road Accidents in India-reference to Kerala
Indonesia	1995	HC	—	691- 958	Accident Costs in Indonesia: A Review June 1997 (Draft Copy), TRL/IRE
Africa					
KwaZulu Natal	199?	HC	4.5%	—	Kwazulu-Natal Road Traffic Safety Strategy (1996-2000)
Tanzania	1996	HC	1.3%	86	1996 Road Safety Programme Tanzania Ministry of Works
Zambia	1990	HC	2.3%	189	TOI Study
Malawi	1995	HC	<5.0%	106	SWK/Iberinsa Road Safety Study, 1997
MENA					
Egypt	1993	HC/CA	0.8%	577	Aly, 'Valuation of traffic accidents in Egypt',
HMC					
UK	1998	WTP	2.1%	28,856	Road Accidents Great Britain: 1998 The Casualty Report
Sweden	1995	WTP	2.7%	6,261	Elvik, 1999
Norway	1995	HC	2.3%	3,656	Elvik, 1999
Iceland	1995	WTP	3-4%	7,175	Arnason, Nordic Road & Transport Research,1996,v8, n3
USA	1994	WTP	4.6%	358,022	NHTSA Technical Report
Germany	1994	HC	1.3%	30,173	Elvik, 1999
Denmark	1992	HC	1.1%	2,028	Elvik, 1999
New Zealand	1991	WTP	4.1%	2,441	Elvik, 1999

Table 11 implies that road crash costs may be of the order of US$65 billion in developing and transitional countries, US$453 billion in highly motorised countries, making a crude estimated total of US$518 billion worldwide.

Table 11 Road crash costs by region (US$billion)

Region	*Regional GNP 1997*	*Estimated annual crash costs*	
		GNP	*Cost*
Africa	370	1%	3.7
Asia	2454	1%	24.5
Latin America/Caribbean	1890	1%	18.9
Middle East	495	1.5%	7.4
Central & Eastern Europe	659	1.5%	9.9
Sub total	5615	64.5	
Highly motorised countries	22,665	2%	453.3
Total			517.8

4 Regional analyses

4.1 Introduction

This chapter provides a 'snapshot' summary of the road safety situation in the individual regions. However the differences within the regions are often as wide as those between them. The regional summary is presented in three parts starting with the current situation and basic safety and motorisation indicators for the ten countries with the largest number of road crash fatalities. (Indicators for all countries are included in the Appendix). A review of the change in the last decade in motorisation, fatalities and population follows with sub-regions or the largest country presented separately. Lastly, information on the type of road crash casualties, including road user type, age and gender distribution, is presented.

Several indicators are used here as no single indicator accurately describes the traffic safety situation in a country. The most common method used in motorised countries is the number of injury crashes per million vehicle kilometres per annum (which relates crashes to a measure of exposure to traffic) but few developing countries have vehicle usage data. Instead, fatality rates, the number of reported fatalities per 10,000 motor vehicles, are regularly used to compare traffic safety records between countries. Yet fatality rates can be expected to be of less importance within a country than the actual number of deaths taking place. Fatality risk, the number of reported fatalities per 100,000 population, is the most common indicator used by the health sector to prioritise diseases and other causes of death. In this section therefore both fatality rates and risks are presented.

Fatality rates will also be prone to error in that the level of accuracy in reporting motor vehicle fleet sizes will vary widely. Vehicle registration databases suffer similar problems to casualty databases with disincentives to register and difficulties in updating databases. Some

countries impose a de-registration fee so few motor vehicles are removed from the official registers while in many countries, owners try to avoid registering vehicles because of the associated fees. The recent PHARE report highlighted the difference between the number of registered vehicles reported by national experts and the IRF, with most countries having more vehicles registered than reported by the IRF (Phare,1999).

It should be stressed again that this short study was limited to the use of available published data. In particular, several of the summaries are based on the road safety reviews recently undertaken in different regions of the world.

4.2 Highly motorised countries

4.2.1 Current situation

While HMCs have the majority of the world's motor vehicles (60%), they account for only 14-15 per cent of the global fatalities and population. There is less variation within HMCs in terms of motorisation and wealth as well as safety levels. Motorisation level, measured by the number of motor vehicles per 1000 population, varies by a factor less than two while the other indicators of GNP per capita and fatality rate and risk vary by four or less.

The ten countries (see Table 12) summarised above represent 88 per cent of total HMCs population. Most HMCs have fatality rates of about 2 or less but the poorest countries of the region, Portugal and Greece, have rates twice as high and which are the highest in the region. Japan had the second largest number of fatalities but a good safety record with a fatality risk half that of the US and a fatality rate which was 40 per cent lower. Figures 3 and 4 show the latest fatality risks and rates values for all HMCs.

Four countries have less than one motor vehicle per two people. In the UK, 30 per cent of households do not own a motor vehicle and so while this region is much more motorised than the rest of the world, many remain without access to a motor vehicle.

Table 12 Basic indicators for 10 HMCs (1996)

	Road fatalities	*Fatality risk (deaths/ 100,000 pop)*	*Motor -isation level (mv/1000 pop)*	*Fatality rate (deaths/ 10,000 mv)*	*GNP per capita ($)*
USA	41,967	15.8	787	2.0	29,339
Japan	9,942	7.9	669	1.2	38,264
Germany	8,758	10.7	559	1.9	28,335
France	8,080	13.8	524	2.6	26,409
Italy	6,198	10.8	617	1.8	20,224
Spain	5,483	14.0	488	1.9	14,509
UK	3,598	6.1	408	1.5	20,946
Canada	3,082	10.3	573	1.8	19,856
Portugal	2,100	21.1	436	4.8	11,024
Greece	2,068	19.7	497	4.0	11,688

4.2.2 Recent trends

As shown in Figure 5, the safety record has improved over the past few decades in many HMCs. Annual road fatalities peaked over thirty years ago in the UK with 7,985 deaths (1966) and six years later for the USA (54,589 deaths). Fatality rates peaked much earlier with, for example the UK's worst peacetime fatality rate of 4.5 occurring in 1930.

With the US accounting for 41 per cent of the country group's fatalities, trends are shown separately for the US and the other nine HMCs. The safety record has continued to improve in both the US and other HMC countries with fatalities decreasing while motorisation increases. Progress was even greater among the other HMC countries with a slightly larger decrease in fatalities but a motorisation and population increase almost twice that experienced in the US. motorisation increases. Progress was even greater

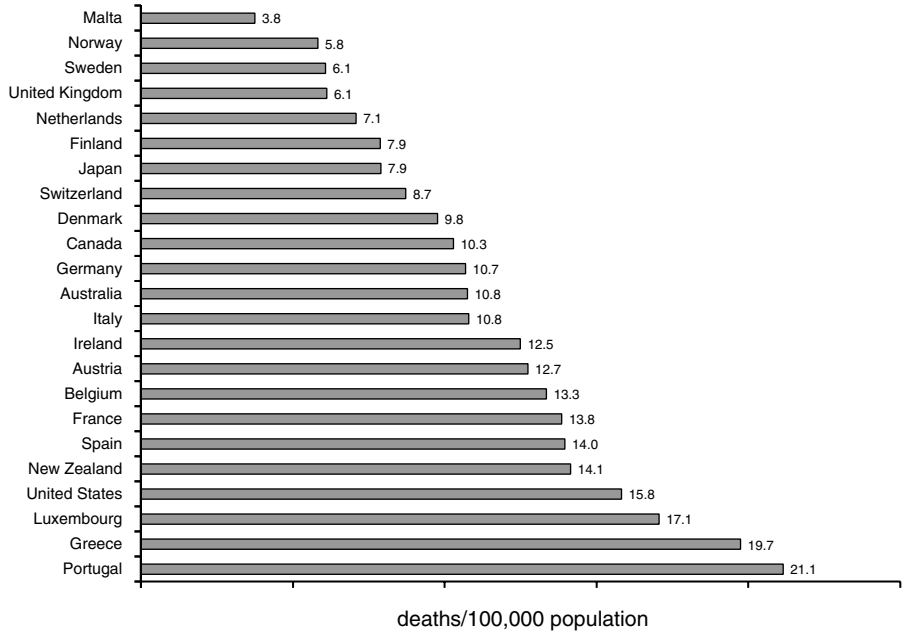

Figure 3 HMC fatality risk (1996)

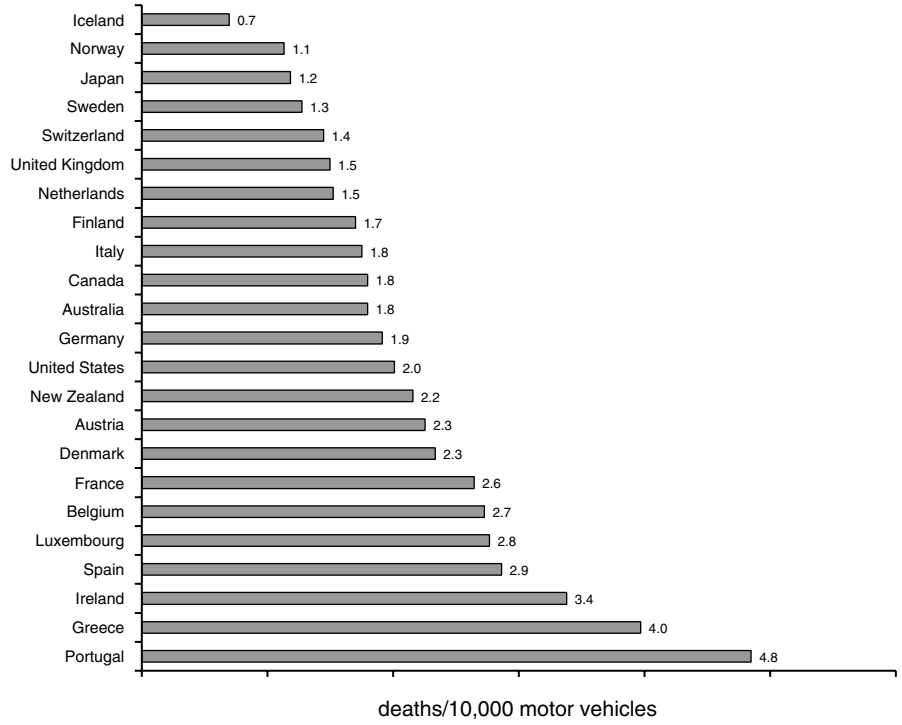

Figure 4 HMC fatality rates (1996)

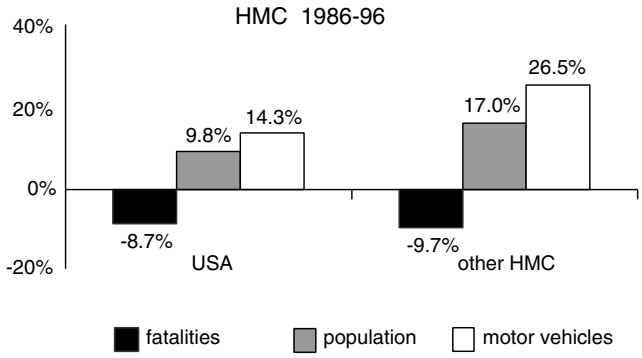

Figure 5 Recent trends in the HMCs

among the other HMC countries with a slightly larger decrease in fatalities but a motorisation and population increase almost twice that experienced in the US.

The continued fatality reduction in HMCs is due to the combined effect of many measures: road safety awareness campaigns, legislation (e.g. making wearing seatbelts compulsory), driver training, road engineering and higher safety standards for vehicles. Whatever the reasons, this experience demonstrates that it is possible to reduce the number of road crash deaths through investment in road safety measures whilst the number of vehicles on the road is increasing.

The recent experience of Victoria State, Australia shows how quickly a significant fatality reduction can be achieved. Since 1990, road deaths and serious injuries have been halved while injury crashes overall have decreased by one third. The 'Victoria Solution' involved the police, highways authority, and the state's statutory monopoly third party insurers joining forces in strict enforcement of speeding and drink drive violations (Corrie, 1998).

4.2.3 Road crash casualties

4.2.3.1 Road user type

Not surprisingly, given the high level of motorisation, car fatalities dominate in most of the HMCs. Japan is the only HMC country reporting the number of pedestrian fatalities as being equivalent to that of car occupants (see Table 13). In many HMCs, pedestrian fatality involvement was one third to one fifth that of car occupants. Pedestrian involvement can be expected to be higher in urban areas, with for example pedestrians accounting for half of road fatalities in London (DETR, 1997)

Table 13 Road fatality by class of road user

	Car	*Pedestrian*
USA	52%	13%
Japan	28%	28%
Germany	61%	13%
France	63%	12%
Italy	55%	13%
Spain	53%	17%
United Kingdom	50%	27%
Canada	54%	13%
Portugal	38%	23%
Greece	42%	22%

Source: DETR, Road Crashes Great Britain: 1998

4.2.3.2 Gender and age distribution

Based on the limited data readily available, females appear to represent approximately one third to one quarter of road fatalities (See Table 14). Where reported, female injuries

Table 14 Female casualty involvement

Country	*Year*	*Fatalities*	*Total casualties*
USA*	1994/95	33%	44%
UK	1996	28%	43%
France	1995	30%	N/a
Spain	1994	23%	N/a

** Fatality data is from the first year and casualty data is from the second year*

appear to be less serious than that of males with females having a larger share of total casualties than fatalities.

Children accounted for a higher share of road casualties in the UK and USA than in other countries, for example, twice as high as that in Italy and Spain. The UK casualty involvement for the under 9's is over three times that of Italy's. Differences such as these are related to social patterns (e.g. whether children walk to school, whether they are accompanied and whether journeys are made in daylight) and, they could also be related to population distribution.

Information on OECD countries has come from the publication 'Road Traffic Statistics in Europe and North America', which uses the age group 25-64. Not surprisingly more than 50 per cent of casualties fall in this wide age group (see Table 15). However more detailed information from specific countries such as UK, USA etc show that about 45 per cent of casualties fall in the 20-40 age group. The adult working age cohort (21-64) accounted for over 60 per cent of all casualties in every country and over two thirds of all casualties in France.

Table 15 Road casualty by age distribution

Age	*Denmark*	*France*	*Italy*	*Norway*	*Spain*	*UK*	*USA*
0-9	4%	5%	2%	5%	3%	7%	6%
10-14	4%	4%	2%	4%	3%	6%	4%
15-17	7%	8%	6%	7%	6%	7%	9%
18-20	12%	10%	9%	11%	11%	10%	10%
21-24	12%	17%	14%	11%	14%	11%	10%
25-64	51%	52%	55%	50%	50%	52%	54%
>65	10%	8%	8%	9%	7%	7%	7%
Unknown	2%	0%	4%	2%	6%	2%	N/a

Recent European Union research has found that for citizens under 45 years, the death rates from road crashes are more than six times higher than from cancer and 14 times higher than from coronary heart disease (Care On The Road, August 1999).

The other traditional vulnerable age group, the elderly, i.e. those aged 65 years and above, accounted for a maximum of one out of every ten road casualties (Denmark). The elderly can be expected to represent a larger percent of fatalities, given their reduced ability to recover from trauma. In the UK, the over 60 age group has a pedestrian fatality rate more than 3 times its casualty involvement rate (15 per cent of pedestrian casualties, but 47 percent of pedestrian fatalities).

4.3 Asia and the Pacific

On a regional basis, road deaths take the greatest toll on the Asia and Pacific region where 44 per cent of the world's road deaths occur and only 16 per cent of the total motor vehicles are found. Current data was available on all of the Asian countries but only a few of the Pacific countries.

The Asian Development Bank (ADB) financed a large scale regional road safety review in 1996. Much of the findings shown below are summarised from the study's 'Road Safety Guidelines for the Asian and Pacific Region' as well as the report on 'Vulnerable Road Users in the Asian and Pacific Region' (ADB, 1998). The study used the sub-regions of newly industrialised economies (NIEs), Central Asia, Southeast Asia, South Asia, Central Asian Republics and Pacific Developing Member Countries (PDMC).

The analysis here is based on official statistics. As stressed in Chapter 2, the under-reporting of road fatalities is intensive and several of the documented cases came from the Asia and the Pacific Region. For instance, the actual number of China's road deaths have been estimated by the official Beijing Traffic Engineering Research Institute to be over 40 per cent greater than that reported in official statistics. Such discrepancies in data need to be re-emphasised here as it is quite likely that the actual current situation is much worse than that being reported and acknowledged.

4.3.1 Current situation

From Table 16 it can be seen that China and India dominate the region (and in fact lead the world) in terms of road deaths. The more motorised countries, Thailand, Korea and Malaysia all lose a larger share of their citizens to road deaths with a fatality risk approximately 5 times that of China and India. Bangladesh with the lowest motorisation level, almost one hundredth that of Malaysia, has the lowest fatality risk but the worst fatality rate of the region. Malaysia is reported to have the highest fatality risk in the world. Fatality risks and rates for the Asia/Pacific region are presented in Figures 6 and 7.

Table 16 Key indicators for the Asia and the Pacific region

	Year	*Road fatalities*	*Fatality risk (deaths/ 100,000 pop)*	*Motor -isation level (mv/1000 pop)*	*Fatality rate*	*(deaths/ 10,000 mv) GNP per capita (US$)*
China	1995	71,495	6	23	26	868
India	1995	59,927	6	31	20	378
Thailand	1996	16,782	28	294	10	2,761
Korea (Rep)	1996	12,653	28	263	11	n/a
Indonesia	1995	10,990	6	73	8	1,124
Malaysia	1996	6,304	31	362	9	4,775
Vietnam	1996	5,581	7	70	11	319
Turkey	1996	5,428	9	83	11	3,179
Pakistan	1996	4,288	3	18	17	484
Bangladesh	1996	2,041	2	4	45	362
Sri Lanka	1995	1,916	11	42	25	808

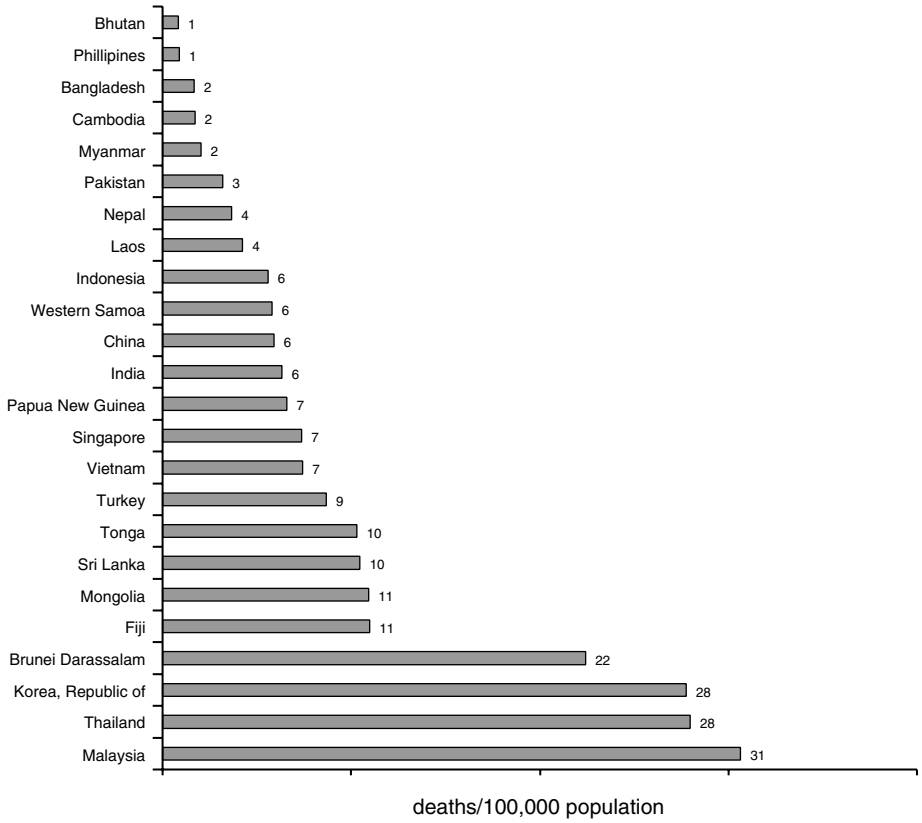

Figure 6 Asia/Pacific fatality risk (1996)

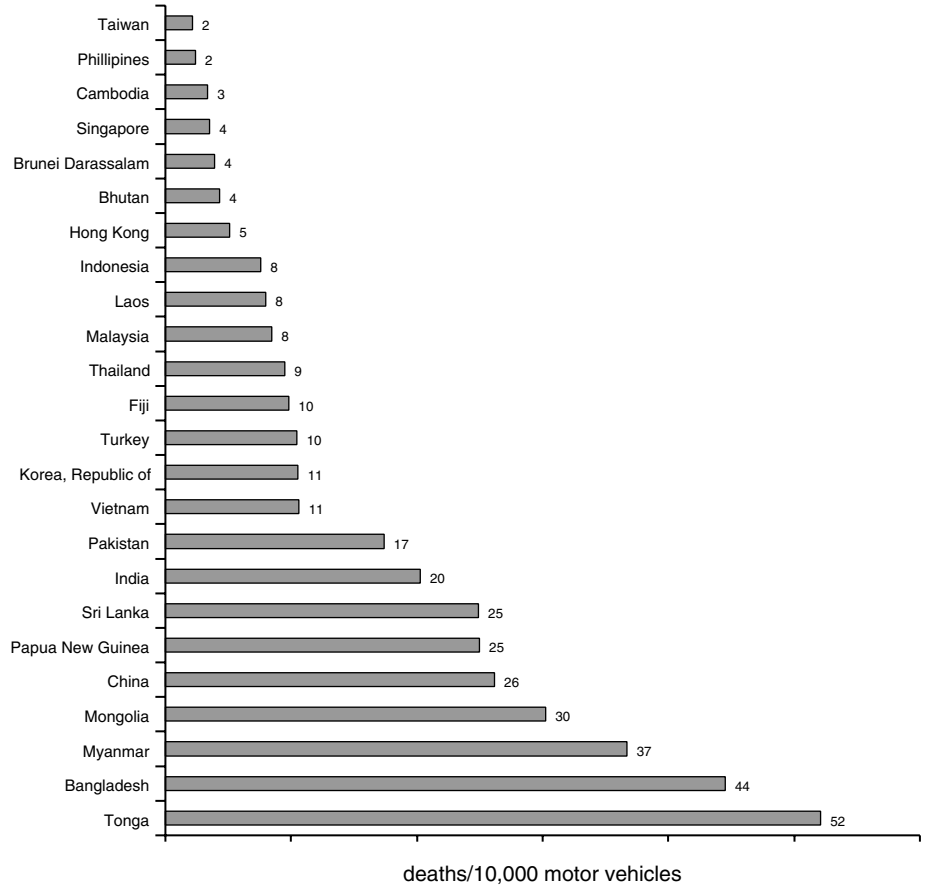

Figure 7 Asia/Pacific fatality rates (1996)

4.3.2 Recent trends

Major changes have taken place in the Asia Region within the last few years (see Figure 8). Motorisation has increased at a rapid rate, largely with the growth in motorcycles. The number of motor vehicles almost trebled in China and more than doubled in the other large Asian countries in less than a decade.

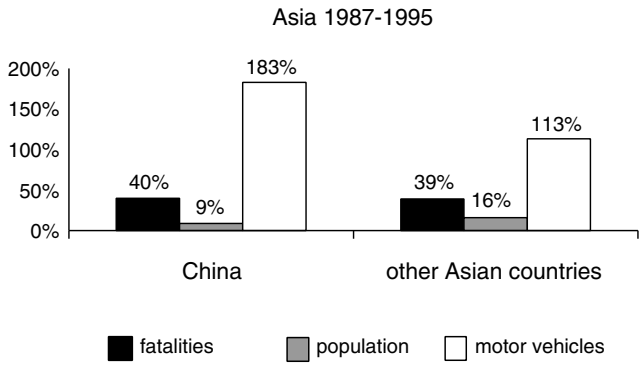

Figure 8 Recent trends in Asia

Population growth was maintained to less than 10 per cent for China, almost half that elsewhere in the region while road deaths increased by 40 per cent in China as in the other nine Asian countries. Accordingly, the personal risk of being killed in a road crash has more than quadrupled in China and more than doubled in the other nine Asian countries.

4.3.3 Road crash casualties

Road user type

The following table examines the involvement of vulnerable road users, i.e. pedestrians, cyclists, and motorcyclists, etc. in different Asian countries. The highest percentages of pedestrian deaths (of the total) were found in Hong Kong (67 per cent), Korea and Sri Lanka (48 and 45 per cent respectively). Conversely, the percentage of pedestrian deaths in Thailand and PR China were particularly low, and even cyclist/non motorised vehicle (NMV) fatalities were reported to be low in China.

4.3.3.1 Gender and age distribution

Female road casualty involvement was relatively high in the region with Taiwan reporting the highest of all LMCs. Bhutan also had a surprisingly large female road casualty share (See Table 18).

Table 18 Casualty distribution by gender (1993)

Country	*Female*
Hong Kong, China	33%
Taiwan, China	49%
Bhutan	38%
Korea	30%
Turkmenistan	23%
Tonga	17%
Western Samoa	35%

Source:ESCAP Asia-Pacific Road Crash Statistics and Road Safety Inventory

As shown in Table 19 and as could be expected, the young and the elderly had a higher fatality involvement than with injuries but the vast majority of pedestrian casualties occurred to the economically active cohort (21-60 years).

4.4 Central and Eastern Europe

The CEE Region accounts for 12 per cent of the world's fatalities, almost twice its share of population or motor vehicles (6-7%). In terms of the number of fatalities per person, it has one of the worst personal safety record of all

Table 17 Percentage crash distribution by Vulnerable Road User (VRU) type

	All VRU		*Pedestrian*		*NMV*		*Motorcycle*	
	Fatal	*Injury*	*Fatal*	*Injury*	*Fatal*	*Injury*	*Fatal*	*Injury*
NIE								
Hong Kong, China	81	56	67	35	4	4	10	17
Republic of Korea	55	n/a	48	n/a	0	0	7	6
Singapore	84	91	25	17	8	5	51	69
Taiwan, China	89	80	19	13	6	5	64	62
Central Asia								
China*	30	N/a	11	9	9	n/a	10	74
Southeast Asia								
Malaysia*	78	68	15	6	6	5	57	57
Thailand	n/a	n/a	9	n/a	4	n/a	n/a	na
South Asia								
Sri Lanka	78	93	45	48	17	19	16	26
PDMC								
Fiji	47	n/a	43	n/a	3	n/a	1	9
Samoa	n/a	52	n/a	37	n/a	6	n/a	n/a

**Data relates to fatalities and injuries instead of fatal and injury crashes.*
Source: ADB Vulnerable Road Users (1998)

Table 19 Age distribution for pedestrian casualties

	Fiji (1992)		*Malaysia (1994)*		*Papua New Guinea (1992)*	
Age	*Death*	*Injury*	*Death*	*Injury*	*Death*	*Injury*
Under 15	16%	10%	11%	10%	24%	16%
16-20	7%	14%	21%	24%	9%	13%
21-60	67%	63%	58%	62%	65%	70%
Over 60	10%	3%	10%	4%	1%	0%

Source: ADB Vulnerable Road Users (1998)

the regions. While current crash and casualty data was readily available for the region, trend data is difficult to collect on many countries and discrepancies, especially with motor vehicles, are frequent.

The European Union recently funded a Phare Multi-Country Road Safety Project that reviewed the road safety situation in 13 countries. Crash data and sector activity was analysed as with the donor funded reviews in Asia and the Pacific and the Latin America and the Caribbean studies. The summary below is based on the PHARE project findings.

4.4.1 Current situation

The ten countries summarised below account for about 87 per cent of the regional population. Russia clearly dominates the fatality situation with both half of the region's fatalities and also the highest fatality risk. Russia's per capita risk of dying in a road crash is over three times that of the Ukraine's (See Table 20). Figures 9 and 10 shows the fatality risks and rates for all CEE countries with data available.

Motorisation ranges widely in the region with the Czech Republic reporting near one vehicle for every two people, almost ten times that of Azerbijan.

Table 20 Key indicators for Central and Eastern Europe

	Year	*Road fatalities*	*Fatality risk (deaths/ 100,000 pop)*	*Motor -isation level (mv/1000 pop)*	*Fatality rate (deaths/ 10,000 mv)*	*GNP per capita (US$)*
Russia	1996	29,468	20	140	14	2,673
Poland	1996	6,359	17	291	6	3,597
Ukraine	1996	3,259	6	n/a	n/a	1,038
Romania	1996	2,845	13	140	9	1,406
Kazakhstan	1996	2,732	17	82	20	1,294
Byelarus	1996	1,730	17	153	11	2,144
Czech Republic	1996	1,386	13	457	3	5,230
Hungary	1996	1,367	13	289	5	4,489
Yugoslavia	1996	1,276	12	185	6	N/a
Bulgaria	1996	1,014	12	297	4	1,167

4.4.2 Recent trends

Trend data were available for very few countries and these did not include Russia. The recent experience of Poland is compared with that of Azerbijan, Lithuania, Bulgaria and Croatia in the figure below. Quite different experiences were reported with road fatalities rising by almost a third in Poland while they were to have decreased by over a third in the other countries. Population changed little with Poland reporting no change at all over the 8 year period. Motorisation increased much faster in Poland while in the other countries, where fatalities had decreased, the number of motor vehicles rose by less than 1 per cent per annum (See Figure 11)

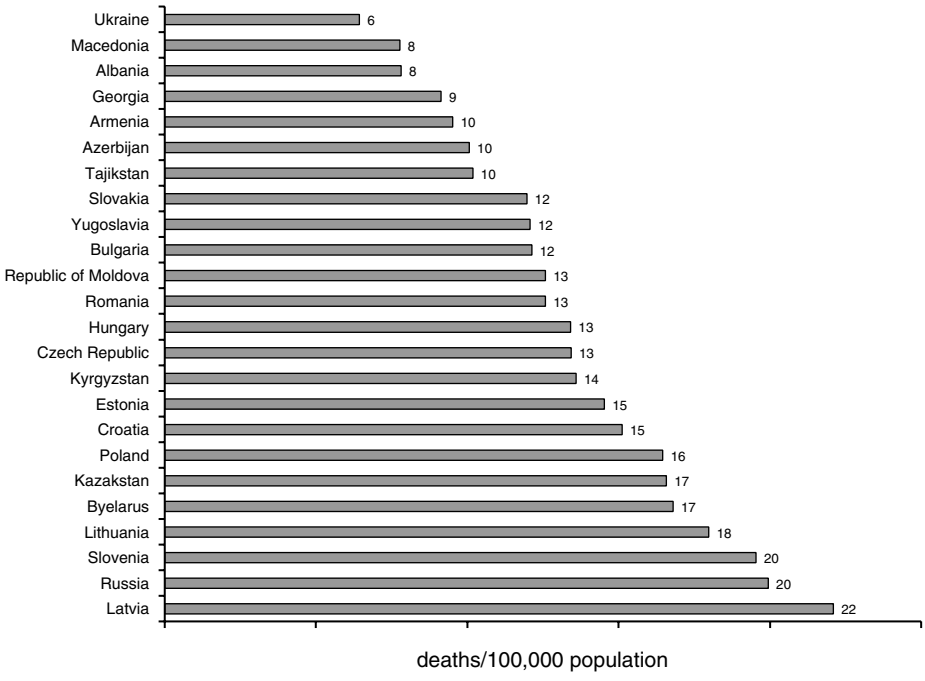

Figure 9 Central/Eastern Europe fatality risk (1996)

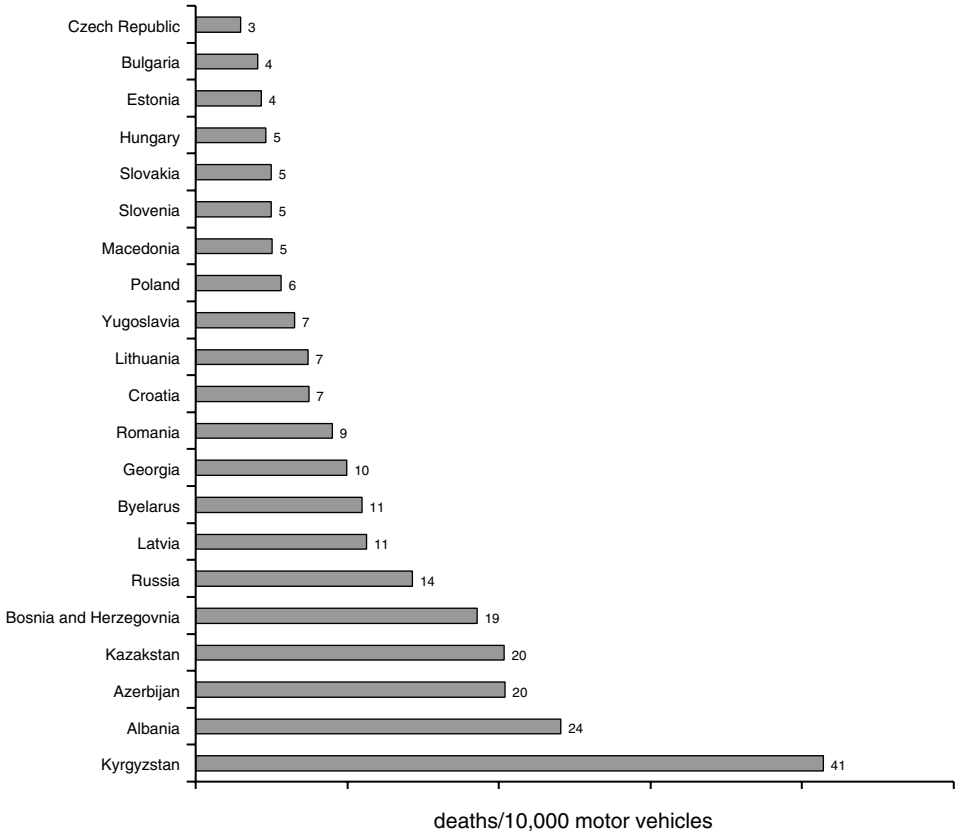

Figure 10 Central/Eastern Europe fatality rates (1996)

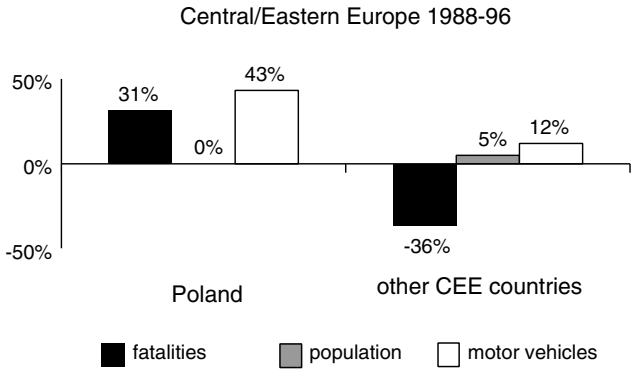

Figure 11 Recent changes in Central/Eastern Europe

4.4.3 Road crash casualties

4.4.3.1 Road user type

The Phare Study reported the overall pedestrian involvement for Eastern European countries for which data was available at 30 per cent. Some countries had a much higher pedestrian involvement rate, including 50 per cent in Romania and Kazakhstan and 60 per cent in Albania. Bus crashes were much less common (i.e. similar to that in HMCs) with only 1-2 percent of crashes in Estonia, Latvia and Slovenia (Phare, 1998).

4.4.3.2 Gender and age distribution

Females accounted for 1 out of every three to four road casualties in the region (See Table 21). Not surprisingly, the countries with higher level of motorisation reported more female involvement in road casualties. Females represented more casualties than fatalities.

Table 21 Casualty distribution by gender

Country	*Year*	*Casualty type*	*Female*
Russia	1995	Fatalities only	25%
Kazakhstan	1995	Fatalities only	24%
Bulgaria	1997	All casualties	32%
Estonia	1997	All casualties	34%
Latvia	1997	All casualties	32%
Slovenia	1996	All casualties	33%

There was less of an identifiable regional pattern with the age distribution of road casualties. Poland reported an exceptionally low rate of children involvement while Estonia and Latvia appeared to have a high proportion of child casualties. Working age adults (between the age of 19 and 59) accounted for between two-thirds to three quarters of all road casualties. The age cohort experiencing the largest number of casualties was the 30-49 year olds (See Table 22) with all five countries reporting a minimum of one quarter of all casualties from this age group.

4.5 Latin America and the Caribbean

The Latin America and the Caribbean (LAC) region has a higher share of fatalities (13%) and motor vehicles (14%) than it does of global population (9%). Crash data was available on 25 of the 33 countries (95 % population representation).

Table 22 Casualty distribution by age

Age	*Bulgaria*	*Estonia*	*Latvia*	*Poland*	*Slovenia*
<18	11%	23%	24%	3%	19%
19-24	7%	17%	15%	10%	20%
25-29	16%	12%	12%	26%	13%
30-49	26%	28%	30%	25%	31%
50-59	25%	10%	9%	24%	8%
60+	14%	10%	11%	12%	9%

The summary presented below is based on the Inter American Development Bank funded 'Review of Traffic Safety Latin America and Caribbean Region' (IADB, 1998) and has been updated where data has since become available.

4.5.1 Current situation

The ten countries summarised below (See Table 23) are all from the South American sub region and account for over 90 per cent of the region's fatalities. As in the other regional summaries, official reported fatality data has been used but the problem of under-reporting needs to be highlighted. The IADB review reported Argentina's true fatality figure to be 30 per cent higher than reported while in Brazil, the actual number of fatalities could be 50-80 per cent higher (IADB, 1998). Mexico has been excluded as its fatality reporting is limited to national highways only. Peru is included but its under-reporting is serious with less than two injuries being reported for every road fatality. Venezuela and Nicaragua were reported to have begun collecting casualty data from hospital to supplement police data.

Table 23 Key indicators for the LAC region

	Year	*Road fatalities*	*Fatality risk (deaths/ 100,000 pop)*	*Motor -isation level (mv/1000 pop)*	*Fatality rate (deaths/ 10,000 mv)*	*GNP per capita (US$)*
Brazil	1996	26,903	16	10	162	4,859
Colombia	1995	7,874	21	55	38	2,326
Argentina	1996	6,473	18	12	155	9,066
Venezuela	1995	2,563	11	58	20	3,555
Peru	1996	2,163	8	25	36	2,622
Chile	1996	1,925	13	11	113	4,890
Cuba	1996	1,424	12	20	64	—
Ecuador	1995	1,112	9	21	45	1,606
Uruguay	1996	693	21	33	65	6,255
El Salvador	1996	656	12	12	103	558

Brazil's fatalities account for 46 per cent of the region's total which is over 3 times as large as the next country's, Colombia. Yet in terms of risk to population, Colombia, Uruguay and Argentina are reported losing a higher percentage of their citizens in road crashes.

Brazil has the highest motorisation level of the larger LAC countries and has 8 times more vehicles per capita than does Venezuela. Yet the Bahama's motorisation level (453 mv/1,000 pop) is almost three times that of Brazil's. As shown in Figure 12, Guyana has the region's worst fatality rate (238 deaths/10,000 mv), while Colombia's fatality rate is one of the worst as is its fatality risk level, Venezuela has the second worst fatality rate in the LAC region. Fatality risks and rates for all LAC countries with data available are presented in Figures 12 and 13.

4.5.2 Recent trends

The Caribbean region experienced the greatest change in the last decade with motorisation almost doubling and road fatalities growing even faster. In the other two regions, motor vehicles grew twice as fast as fatalities.

The rate of increase in road deaths was twice that of population in Mexico and Central America and South America and over 7 times that of population in the Caribbean. Thus the relative risk of road deaths increased throughout all LAC but dramatically so in the Caribbean.

Motor vehicle ownership is still low for the region overall with half of the countries reporting motorisation levels of under 100, i.e. less than 10 per cent of the population have access to a motor vehicle.

4.5.3 Road crash casualties

4.5.3.1 Road user type

Data from the Latin America/Caribbean study showed wide variation in road user type involvement with little consistency reported within the sub-regions. Despite the region's low motorisation level, pedestrians and bus passengers only accounted for over half of all fatal road crashes in Honduras and Peru (See Table 24). Mexico's high rate of car involvement reflects the data being limited to federal highways only but the low rate of pedestrian involvement is still surprising. Car involvement was substantial in several countries. Bus involvement was low overall (though still varying by 9 times) and Ecuador appears to have a problem with commercial vehicles.

Table 24 Fatal road crash by road user/vehicle type

Country	*Year*	*Pedes -trian*	*Car*	*Bus*	*Comm. veh*	*Motor -cycle*	*Other*
Caribbean							
Dominican Republic	1995	15%	27%	5%	17%	29%	7%
Trinidad and Tobago	1993	29%	48%	2%	16%	2%	3%
Mexico & Central America							
Honduras	1995	25%	41%	16%	12%	3%	3%
Mexico*	1995	2%	93%	3%	n/a	n/a	2%
South America							
Chile	1995	24%	48%	10%	11%	2%	5%
Ecuador	1995	14%	19%	18%	44%	3%	2%
Peru	1995	45%	9%	9%	19%	1%	17%
Uruguay	1993	5%	58%	4%	14%	11%	8%

** Highway fatal crashes only*
Source: IADB, 1998

4.5.3.2 Gender and age distribution

As with the other LMC regions, female fatality involvement was low with approximately one of every five fatalities being female. There was little variation between the countries reporting with females accounting for between 19 and 23 per cent of all fatalities (See Table 25).

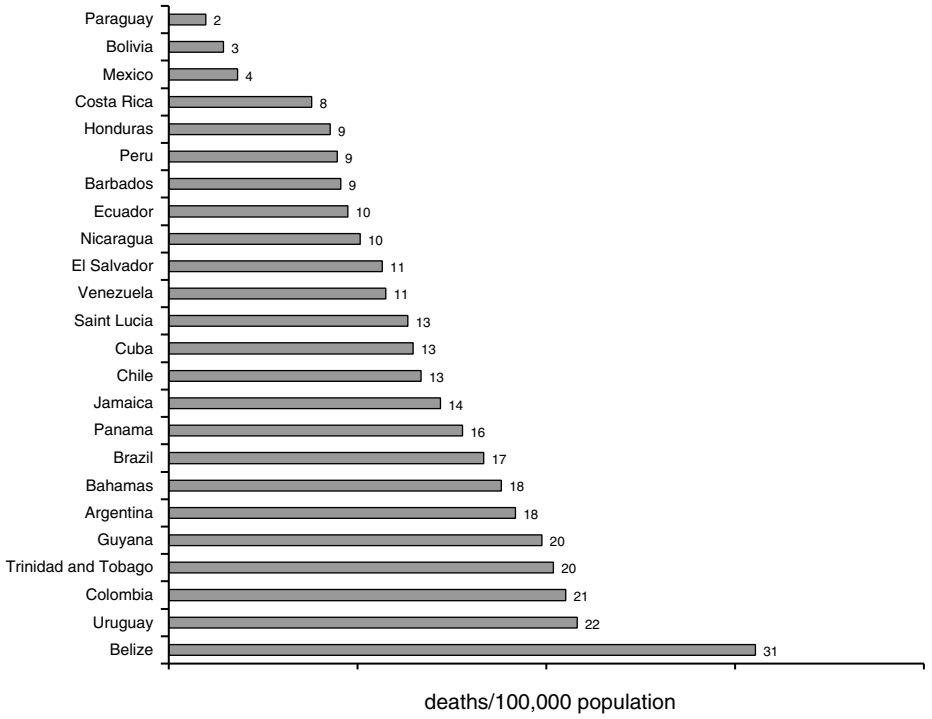

Figure 12 Latin/Central America and the Caribbean fatality risk (1996)

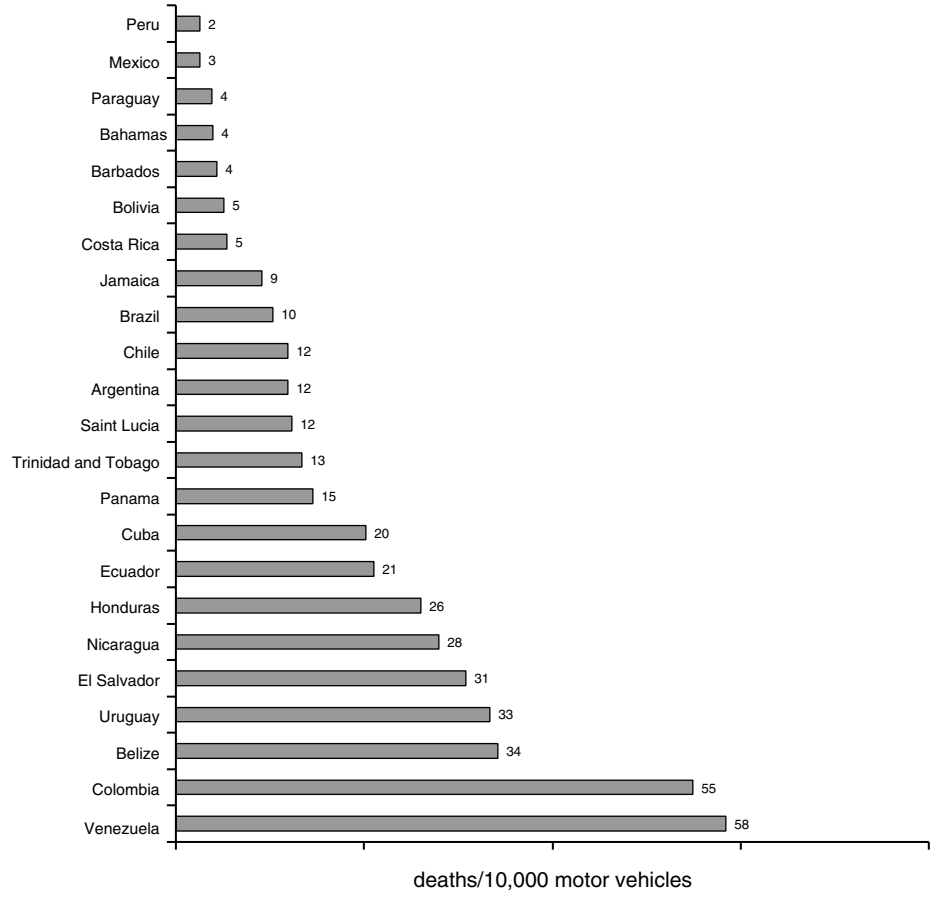

Figure 13 Latin/Central America and the Caribbean fatality rates (1996)

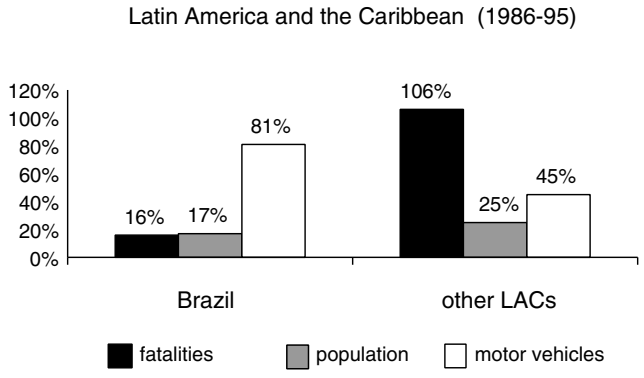

Figure 14 Recent trends in LAC

Table 25 Fatality distribution by gender

Country	*Year*	*Male*	*Female*
Central America			
Mexico	1995	79%	21%
South America			
Argentina	1993	77%	23%
Brazil	1993	78%	22%
Chile	1994	81%	19%
Colombia	1994	79%	21%
Cuba	1995	77%	23%
Ecuador	1995	78%	22%
Venezuela	1994	80%	20%

Source: WHO Statistics Yearbook 1996, IADB 1996

Of the three countries with casualty age data available, Chile's child involvement was highest with one of every seven casualties involving a child, over twice that of Honduras. The working age cohort (15-59 years) represented the majority of all crash casualties in the three countries reporting casualty age with 92 per cent of all casualties in Honduras coming from this age group (See Table 26). Argentina appears to have a problem with the elderly in road crashes with one of every five casualties being over 60 years of age.

Table 26 Casualty distribution by age

	Argentina	*Honduras*	*Chile*
Under 15	9%	6%	14%
15-39	47%	71%	66%
40-59	24%	21%	12%
60+	20%	2%	8%

Source: IADB, 1998

4.6 Africa

Africa's global road fatality share is three times as large (11%) as it's motor vehicle share. Crash data was available on only half of African countries but those countries accounted for two-thirds of the regional population. Even less series data was available, especially with motor vehicle data, and it was not possible to identify the recent trend in motorisation save for South Africa.

It should be noted that there is, to date, no equivalent in Africa to the regional studies recently undertaken in Asia, Eastern Europe and Latin America/Caribbean.

4.6.1 Current situation

There are wide differences within Africa with South Africa's GNP per capita over 30 times greater and the motorisation level over 100 times that of Ethiopia. South Africa has more than twice as many vehicles per capita as does the next and neighbouring country of Zimbabwe. Four of the largest 10 countries have motorisation levels under 10. This extremely low motorisation level indicates it will be decades before the majority of families have access to a motor vehicle.

The ten countries shown in Table 27 account for almost 90 per cent of all the road fatalities reported in the region. Two countries, South Africa and Nigeria, account for more than half of the region's road fatalities. Africa may be known for having the highest fatality rates, but with the low number of vehicles, road crashes have not become a national health priority as relatively few people are killed. For instance, death rates (per 10,000 motor vehicles) may be ten times greater in Ethiopia than in South Africa but, in terms of per capita, South Africa's road crash fatality risk is nine times greater than Ethiopia's. Diseases such as malaria, HIV and tuberculosis pose a much greater threat to the regional population and rightfully take precedence on the health agenda. Fatality risks and fatality rates for African countries are shown in Figures 15 and 16.

Table 27 Road safety indicators for 10 African countries

	Year	*Road fatalities*	*Fatality risk (deaths/ 100,000 pop)*	*Motor -isation level (mv/1000 pop)*	*Fatality rate (deaths/ 10,000 mv)*	*GNP per capita (US$)*
South Africa	1994	9,981	27	158	17	3458
Nigeria	1993	8,958	8	12	65	291
Algeria	1993	3,678	13	52	24	1529
Kenya	1993	2,516	9	14	64	353
Ethiopia	1996	1,693	3	1	195	112
Uganda	1995	1,594	8	7	122	335
Tanzania	1994	1,548	5	5	111	217
Zimbabwe	1996	1,205	11	64	17	730
Malawi	1996	1,090	11	6	193	213
Zambia	1996	928	10	26	39	384

Source: IRF 1999 and country studies

4.6.2 Recent trends

As shown in Figure 17, South Africa's experience has been quite different from other countries. The road fatality toll has grown by over a quarter in the other large African countries (Nigeria, Kenya, Ethiopia, Tanzania, Malawi and Zambia) over the past several years. South Africa, on the other hand, experienced a boom in both motorisation and population while road fatalities, since peaking in 1991, appear to have stabilised at approximately 10,000 fatalities per year. The relative personal safety risk doubled for many African countries while it decreased for South Africa (although by comparison it is still very high).

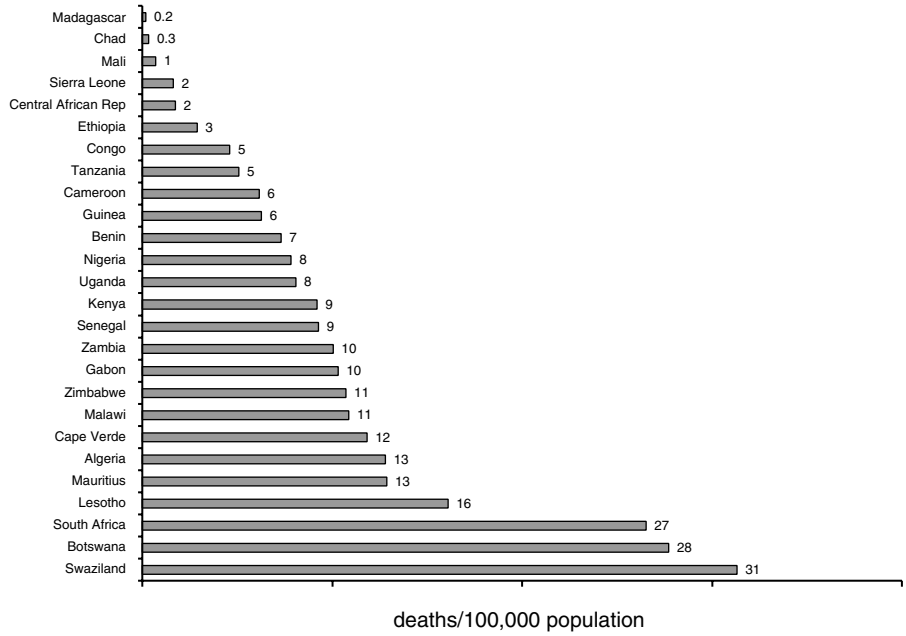

Figure 15 Africa fatality risk (1996)

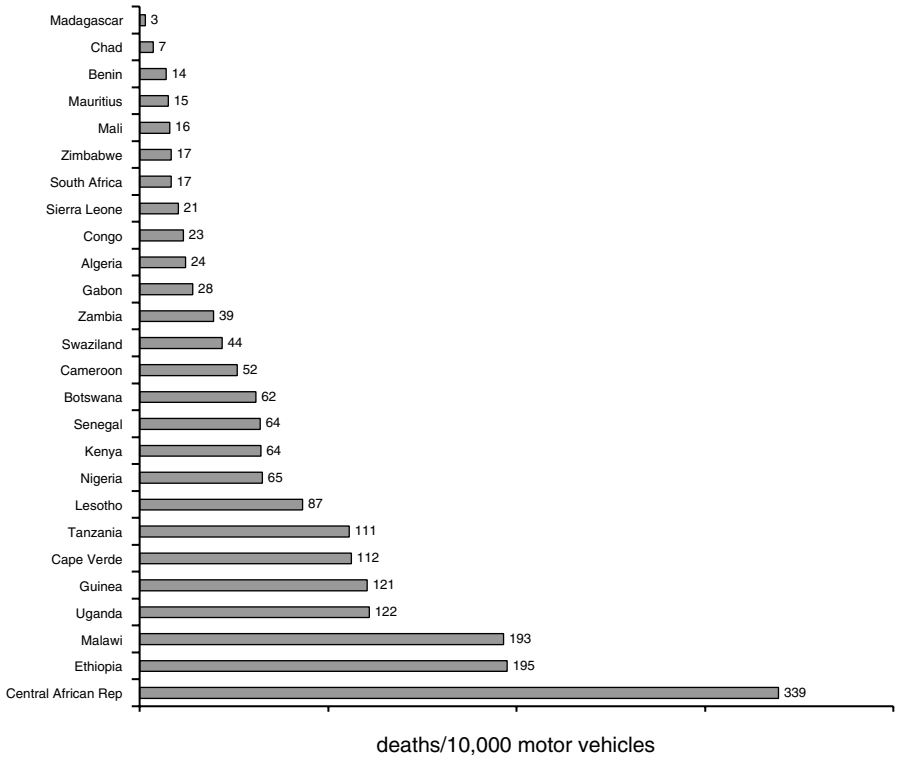

Figure 16 Africa fatality rates (1996)

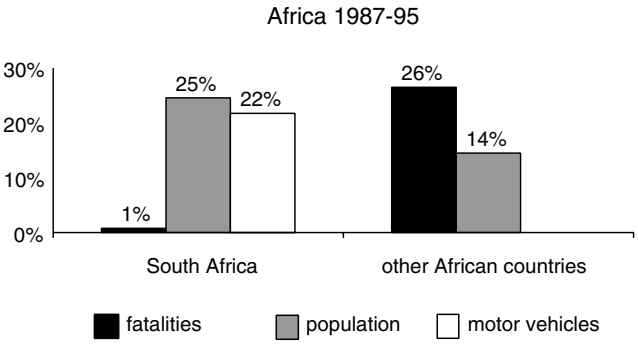

Figure 17 Recent trends in Africa

4.6.3 Road crash casualties

Casualty information was limited to the few countries where published data was found. An earlier study found that single vehicle collisions (including pedestrian crashes) accounted for two thirds of all crashes in Zimbabwe, Botswana and Ghana (Gorell, 1997)

4.6.3.1 Road user type

Consistent with the increased motorisation level, drivers accounted for a much larger share of road fatalities in South Africa and Zimbabwe than in Ethiopia or Zambia. However pedestrians were the most frequently reported road fatality type in all the countries save for Botswana and Malawi where passenger deaths dominated. Kenya and Tanzania also reported cyclist fatality involvement of 9 and 11 per cent respectively while motorcyclists represented 2 per cent of road fatalities in both countries (Assum, 1998).

Table 28 Road fatality distribution by road user type

Country	*Year*	*Driver*	*Passenger*	*Pedestrians*
Ethiopia	1998	7%	43%	51%
Kenya	1995	11%	34%	44%
Malawi	1994	10%	53%	37%
South Africa	1994	27%	32%	41%
Tanzania	1995	6%	41%	40%
Zambia	1996	8%	38%	54%
Zimbabwe	1996	28%	27%	44%

Source: Dhliweyo (1997), Assum (1998) and TRL internal reports

There is also a clear difference between the pattern of casualties in urban and rural areas. In urban areas of Zambia, pedestrians account for two-thirds of fatalities and over half of all road traffic casualties compared to only 30 per cent of fatalities and 12 per cent total casualties in rural areas. Likewise in Ethiopia, pedestrians represented 85 per cent of all casualties within Addis Ababa yet only 40 per cent nationwide, second to passengers (50 per cent).

4.6.3.2 Gender and age distribution

Road casualty distribution by gender was available for Ethiopia and Zimbabwe while Zambia only records the gender of child casualties. In Ethiopia, females accounted for one out of every four road traffic casualties and the distribution was consistent with all casualty severities. Crash involvement was lower in Zimbabwe where only one out of every six road casualties female. Five per cent of the drivers killed in road crashes in Ethiopia were women.

Children aged under 15 are estimated to represent half of Africa's population. In relative terms, their crash involvement rate is low overall (See Table 29) but higher for pedestrians. In Zambia, boys were reported to have an involvement rate 50% higher than girls for all casualty severities.

Table 29 Child road casualties (1996-98)

	Casualties		*Pedestrians*	
	Fatal	*Total*	*Fatal*	*Total*
Ethiopia	14%	12%	20%	20%
Zambia	14%	10%	18%	20%
Zimbabwe	9%	7%	20%	22%

4.7 Middle East and North Africa

With only 2 per cent of the world's motor vehicles, 4 per cent of the world's population reside in the Middle East and North Africa (MENA) region which experiences 6 pe cent of the global road fatalities. Of the 18 countries assigned to this region, crash data was found for 13 of the countries (88 % regional population)

The analysis below is based on published data and country reports. Bahrain, despite having the fewest number of road fatalities of all countries reporting, is to be credited for producing an annual traffic crash facts booklet which includes much data, summary and even collision diagrams at the country's worst locations.

4.7.1 Current situation

Key indicators are shown below for all countries with crash data available but it should be noted that the data is almost five years old for several countries, including the two countries with the largest number of road deaths, Egypt and Saudi Arabia. Fatality risk in Saudi Arabia is three times that of Egypt but conversely Egypt has a higher fatality rate. See Figures 18 and 19 for fatality risks and rates in order of severity.

Three countries, Israel, Bahrain and Lebanon have much higher motorisation levels than the rest of the region (See Table 30). Despite Israel reporting a GNP per capita almost five times that of Lebanon, the latter has a higher motorisation level. Saudi Arabia has a low motorisation level considering its relatively high per capita income.

4.7.2 Recent trends

From the limited data available, road deaths appear to be a growing problem in the MENA region (See Figure 20). In recent years, road deaths have grown faster than population, 40 per cent faster in Saudi Arabia and more than 60 per cent faster in the countries of Bahrain, Israel, Lebanon, Morocco, Syria, and Yemen.

Motor vehicle data was limited and often suspect with Saudi Arabia, for example reporting a motor vehicle fleet almost halving between 1991 and 1993. The other countries reported an increase of 15 per cent in motor

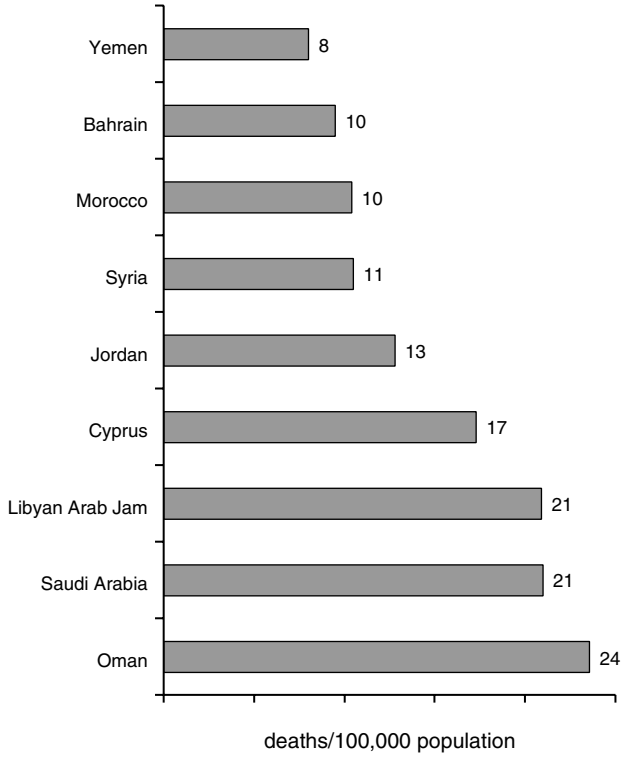

Figure 18 Middle East and North Africa fatality risk (1996)

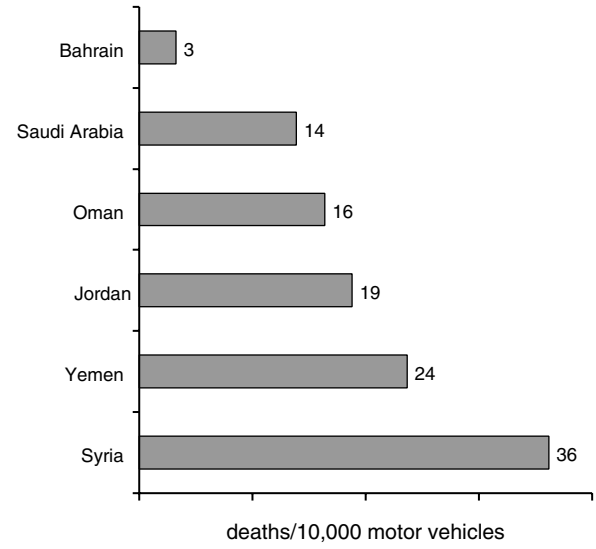

Figure 19 Middle East and North Africa fatality rates (1996)

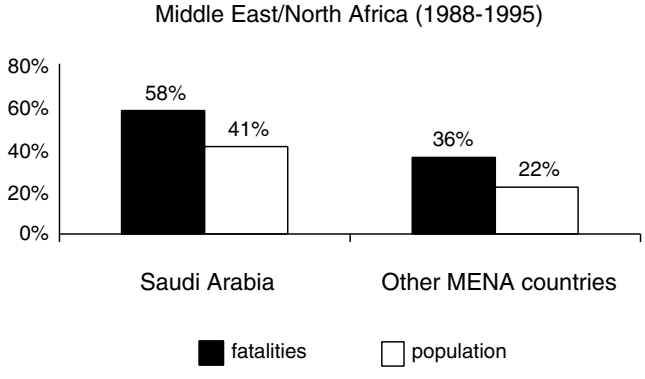

Figure 20 Recent trend in MENA region

Table 30 Key indicators for the MENA region

	Year	*Road fatalities*	*Fatality risk (deaths/ 100,000 pop)*	*Motor -isation level (mv/1000 pop)*	*Fatality rate (deaths/ 10,000 mv)*	*GNP per capita (US$)*
Egypt	1994	4,400	7	37	20	1,218
Saudi Arabia	1994	4,077	21	151	14	7,390
Iran	1995	2,963	5	81	6	1,738
Morocco	1996	2,807	10	n/a	n/a	1,272
Syria	1995	1,524	11	29	36	1,148
Yemen	1996	1,267	8	34	24	279
Libya	1996	1,080	21	n/a	n/a	n/a
Jordan	1996	552	13	68	19	1,567
Israel	1997	530	9	271	3	16,585
Oman	1996	512	24	144	16	n/a
Lebanon	1994	328	8	333	2	3,408
Cyprus	1996	128	17	n/a	n/a	n/a
Bahrain	1996	57	10	294	3	n/a

vehicles between 1993 and 1996, with Israel and Syria experiencing rises of 22 and 24 per cent respectively.

4.7.3 Road user type

Pedestrian deaths as a percentage of all road fatalities are amongst the world's highest in this region, with Lebanon reporting the highest pedestrian fatality involvement rate for any country in this study (See Table 31).

Table 31 Pedestrian road fatalities

	Year	*Road fatalities*
Jordan	1997	42%
Bahrain	1997	33%
Lebanon	1994	62%

Pedestrians usually account for a smaller percent of injuries. For all casualties, Bahrain reported that 23 percent were drivers, 37 percent passengers and 20 percent pedestrians. In 1997, Jordan reported 244 pedestrian deaths with a further 5730 pedestrian injuries, for a pedestrian injury to fatality ratio of 23 to 1.

4.7.3.1 Age and gender distribution

Published data on road casualty distribution by gender was only found in two countries. Females accounted for 21 per cent of all traffic casualties in Lebanon and 29 per cent in Bahrain. Not surprisingly, males accounted for the highest percentage of driver casualties even in those countries where women were allowed to drive, e.g. 80 per cent in Bahrain.

Lebanon reported high fatality involvement of both the young and the elderly; 25 percent of male and 35 percent of female fatalities occurred to those under the age of 24 while 38 per cent of male and 30 per cent of female fatalities involved those over the age of 55 (Choueiri, 1995).

Jordan is reported to have a serious child pedestrian casualty problem with two out every three pedestrian casualties under the age of 20 (Elleveset, 1998). Bahrain also reported over half of all pedestrian casualties were under the age of 20. The youngest seem to be most at risk

with 38 per cent of all pedestrian casualties occurring to those under 10 years of age.

4.8 Summary

This chapter has attempted to highlight the road safety situation within the various regions. It has shown that fatality rates (i.e death per 10,000 vehicles) were lowest in HMCs whilst the highest were found in African countries, particularly Ethiopia, Uganda and Tanzania. Fatality risk (i.e. deaths per 100,000) was highest in a disparate group of countries including Thailand, Malaysia, South Africa, and Saudi Arabia. In most of these analyses, as might be expected, values in Central and Eastern European countries lay closer to the HMCs, than to countries of Africa, Asia or Latin America.

The relative regional share of fatalities, population and motor vehicles worldwide is shown in Table 32.

Table 32 Distribution of road fatalities, motor vehicles and population

	Fatalities	*Motor vehicles*	*Population*
HMC	14	60	15
Asia/Pacific	44	16	54
Central and Eastern Europe	12	6	7
Latin America and Caribbean	13	14	8
Africa	11	4	11
Middle East and Northern Africa	6	2	4

One of the most important differences between HMCs and the LMC regions is that over the last ten years or so the number of deaths taking place actually fell by about 10 per cent in HMCs, whilst in the Africa, Asia/Pacific and Latin America regions road deaths continued to rise. In Central and Eastern Europe there was a marked difference between Poland where deaths increased by 31 per cent and other countries where deaths fell.

Over the period 1987-95 deaths in the Asia Pacific region rose by 39 per cent, in Africa by 26 per cent (excluding South Africa) and in the MENA region by over 36 per cent. In Africa and Asia there is now some evidence that the rapid increase in road deaths throughout the 1970s and early 1980s is now slowing down but nevertheless the problem still causes concern in these regions.

As might be expected, the majority of people killed in HMCs are car drivers and passengers and about 20 per cent are pedestrians. In Asian countries a wide variation was found with, for example, almost 70 per cent of those killed being pedestrians in Hong Kong and about 50 per cent in Korea. In China, Malaysia and Thailand, pedestrian deaths were surprisingly low at around 10-15 per cent of the total. Conversely in Singapore, Taiwan (China) and Malaysia over 50 per cent of deaths were motorcyclists.

In African countries, pedestrians were again one of the main classes of road users involved in fatal crashes. Pedestrian deaths also featured strongly in Middle Eastern countries (usually over 30 per cent of all deaths).

An analysis of deaths by gender showed wide variation between countries (even within regions). The overall tendency however was for females to be more involved in non fatal crashs than in fatal. This probably indicates the fact that females tend to be injured in urban crashes at lower speeds. The overall tendency was for there to be proportionately more females involved in both fatal and non-fatal crashes in the higher income countries.

An analysis of casualties and fatalities by age showed that young people are involved in proportionately more crashes in Africa, Asia and the Middle East than in HMCs. In general the data from all regions indicated that crashes involving the economically active in the age group 25-40 dominate.

5 Summary and conclusions

The GRSP was launched in order to ‘reduce the number of deaths, injuries and disabilities and associated social costs of road crashes through partnerships which promote collaboration and coordination of road safety activities among GRSP participants’.

The World Bank, DFID (UK) and TRL agreed jointly to fund a study in order to assist the GRSP to define as best as possible the magnitude of the road safety problem, particularly in LMCs. The results of this study are presented in this report but it should be emphasized that the study itself has highlighted the difficulty in obtaining a reliable annual estimate of global road crash fatalities and injuries.

Using published data as a base, the study estimates that in 1999 between 750,000 and 880,000 people may die as a result of road crashes and that the majority of these deaths are occurring in the LMC regions, with approximately half in Asia-Pacific. This compares with a recent estimate by the World Health Organisation of over a million deaths in 1998.

Road fatalities, whether 750,000 each year or in excess of 1 million are still a leading cause of death and available data sources show that they are an even greater cause of premature mortality. Road fatalities are expected to continue to increase with a fatality toll between 900 thousand and 1.1 million in 2010 and reach between 1.1 million and 1.3 million in 2020.

This study has also produced a fairly crude estimate of annual injuries which indicates that in 1999, between 23 to 34 million people were injured in road crashes worldwide. Due to the unreliability of the data and the extent of under-reporting, the severity of road crashes as a major cause of injury is being seriously under-estimated.

Information from those countries which have attempted to cost road crashes on an annual basis now suggests that road crashes may be costing closer to 2 per cent of GNP per annum than the often used value of 1 per cent in motorised countries. However in developing countries costs are proportionately less than this and 1 per cent of GNP may still be a reasonable (but albeit crude) estimate. In transitional countries cost probably lies somewhere between the two. Estimates were derived of what this meant in global and regional terms and it was found the global cost in 1998 might have been of the order US$520 billion. The cost in the LMC regions, using the stated criteria, would have been about US$65 billion.

Trend data showed that the total number of people killed in road crashes in regions of the developing world continues to increase, whereas in the West there has been a steady decrease over the last fifteen years or so. For example, between 1987-1995 deaths in the Asia-Pacific rose by 40 per cent, in Africa by 26 per cent (excluding South Africa where deaths increased very little) and the Middle East/North Africa region by over 36 per cent. Road deaths doubled in a few Latin America countries and rose by 16 per cent in Brazil. Central and Eastern Europe showed wide variation with fatalities increasing in Poland by 31 per cent but while decreasing in other countries by about 36 per cent. Conversely road deaths in highly motorised countries fell by about 10 per cent.

Growth rates are highly sensitive to the time period selected and analysis method used but the general trends shows global road fatalities increasing at a slower rate in the next two decades. Based on trend series data from a limited number of countries (43), the increase in fatalities in Africa and Latin America will continue to increase for a few more years before slowing down while the fatality growth in Asia and the Middle East is slowing down. The decrease in fatalities in the West is expected to continue but at a slower rate.

Results also show that the highest fatality rates (deaths per 10,000 motor vehicles) worldwide occur in African countries, particularly Ethiopia, Uganda and Malawi whilst fatality risk (deaths per 100,000 population) is highest in a disparate group of countries including Thailand, Malaysia, South Africa and Saudi Arabia.

Males in the most economically active age group make up the largest proportion of reported victims of road crashes. Previous studies have found that children in developing countries tend to be more at risk than in the developed world. However, they account for a relatively small percent of reported road crash casualties.

Women's fatality involvement appears to increase with motorisation. It should be noted that while women in less motorised countries may currently have a low accident risk, research shows that the crash consequences are often more severe for women as there is often less investment in their medical treatment and recovery. Furthermore, their legal status as widows is often very unfavorable and the loss of a husband can mean the break up of a family.

It should be emphasised that pedestrians are a particularly high risk group throughout Africa and Asia as well as the Middle East. Car occupant casualties dominate in HMCs and are much more common in the Latin America/Carribean region.

5.1 Areas for future consideration

Based on the data available, this study has provided an estimate of the current road fatality toll both globally and by region. It has also, shown the weaknesses of the existing data and the need to put any road casualty estimate into context. Data on fatalities is more readily available, but it is likely that casualty information would present a clearer overall picture of how much road crashes impact on life and the economy. The following points show possible areas that could be examined within the GRSP programme so that a greater understanding of the road crash situation can be obtained.

- Fatalities represent the 'tip of the road casualty iceberg', and much more priority needs to be given to the collection of road injury data. This information can then be used to assess the relative importance of the problem from both an economic and social viewpoint.
- A more accurate picture of the number of injuries sustained in road crashes would be obtained from hospital data. Hospital recording systems could be improved and complement the police system. The medical community, led by WHO, could give greater priority to monitoring road crash casualties and include road crashes in national hospital surveillance systems.
- The accident database in many countries could be improved with an accident recording database such as MAAP, which provides an easy to use and low cost method of storing and analysing data.
- Evidence exists that inadequate use is made of even the limited amount of accident information collected in developing countries. More research is needed into the dissemination and application of crash data in selected countries.
- The economic costs of road crashes are, in general, not well understood as much of the cost is hidden and incurred in small-scale crashes rather than in large incidents like rail or air disasters. Further research is merited on crash costing, including the application of crash costs.
- Crash statistics alone are insufficient to assess the road safety situation and other performance indicators, especially those which can be targeted at improving vulnerable road user safety, should be used. Possible indicators include the number of pedestrian crossings installed, number of safety audits conducted, i.e.inspecting a road for the accident , number of hazardous locations improved, etc.

This study has attempted to identify the magnitude and nature of the road safety problem worldwide but particularly in the LMC regions of Africa, Asia/Pacific and Latin America and the Caribbean. Hopefully the newly formed GRSP can assist to reduce this global toll of death and injury by the mechanism of partnerships which promote collaboration and coordination of road safety activities worldwide.

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Appendix A: Basic traffic safety and soci-economic indicators

Table A1 Highly Motorised Countries (HMC)

		Reported							30 day				GNP (US$ 1997)	
	Year	Fatality definition	Fatalities	Injuries	Fatality index	MV in use 1996	Reported fatality rate	Population 1996 ('000s)	Adj. factor	Fatalities	Reported fatality risk	Motor -isation level	Per capita	Total (millions)
Australia	1996	30	1,970	17,048	n/a	10,956,000	1.8	18,312	1.00	1,970	10.8	598.3	20,899	382,705
Austria	1996	3	1,027	56700	0.02	4,554,237	2.3	8,059	1.15	1,181	12.7	565.1	27,965	225,373
Belgium	1996	n/a	1,356	68259	0.02	4,977,040	2.7	10,159	1.00	1,356	13.3	489.9	26,812	272,382
Canada	1996	n/a	3,082	230885	0.01	17,171,776	1.8	29,964	1.00	3,082	10.3	573.1	19,856	594,976
Denmark	1996	n/a	514	9757	0.05	2,199,000	2.3	5,262	1.00	514	9.8	417.9	35,034	184,347
Finland	1996	n/a	404	9299	0.04	2,372,470	1.7	5,125	1.00	404	7.9	462.9	24,858	127,398
France	1996	6	8,080	170117	0.05	30,558,000	2.6	58,375	1.09	8,807	13.8	523.5	26,409	1,541,630
Germany	1996	n/a	8,758	493,158	0.02	45,821,425	1.9	81,912	1.00	8,758	10.7	559.4	28,335	2,320,985
Greece	1996	n/a	2,068	31,658	0.06	5,206,776	4.0	10,475	1.00	2,068	19.7	497.1	11,688	122,430
Iceland	1996	n/a	10	1,556	0.006	143,579	0.7	270	1.00	10	3.7	531.8	—	—
Ireland	1996	n/a	453	9,831	0.04	1,339,000	3.4	3,626	1.00	453	12.5	369.3	17,964	65,137
Italy	1996	7	6,198	264,213	0.02	35,394,150	1.8	57,380	1.08	6,694	10.8	616.8	20,224	1,160,444
Japan	1996	1	9,942	942,203	0.01	84,067,073	1.2	125,761	1.30	12,925	7.9	668.5	38,264	4,812,103
Luxembourg	1996	n/a	71	1,538	0.04	256,737	2.8	416	1.00	71	17.1	617.2	—	—
Malta	1996	n/a	14	738	0.02			373	1.00	14	3.8	—	9,378	3,498
Netherlands	1996	ex. cyc	1,099	10,462	0.10	7,226,000	1.5	15,517	1.00	1,099	7.1	465.7	25,975	403,057
New Zealand	1996	30	514	16,600	0.03	2,380,000	2.2	3,635	1.00	514	14.1	654.7	16,379	59,539
Norway	1996	n/a	255	12,025	0.02	2,253,819	1.1	4,381	1.00	255	5.8	514.5	36,287	158,973
Portugal	1996	n/a	2,100	66,627	0.03	4,330,600	4.8	9,930	1.00	2,100	21.1	436.1	11,024	109,472
Spain	1996	1	5,483	124,157	0.04	19,167,769	2.9	39,260	1.30	7,128	14.0	488.2	14,509	569,637
Sweden	1996	n/a	537	20,810	0.03	4,218,258	1.3	8,843	1.00	537	6.1	477.0	26,225	231,905
Switzerland	1996	1	616	26,539	0.02	4,262,411	1.4	7,074	1.30	801	8.7	602.5	43,149	305,238
United Kingdom	1996	30	3,598	316,704	0.01	24,001,000	1.5	58,782	1.00	3,598	6.1	408.3	20,946	1,231,269
United States	1996	30	41,967	3,399,000	0.01	208,801,157	2.0	265,284	1.00	41,967	15.8	787.1	29,339	7,783,092
Countries w/ RTC data	24		100,116	6,299,884	0.016	521,660,273		828,175		106,305			27,368	22,665,590
Andorra								71						
Monaco	1995			194				32						
San Marino														
Countries w/o RC data*	3							103						-
Regional total	27							828,278					27,365	22,665,590

Netherlands: assume exclusion refers to single vehicle cycle fatalities
Data sources: IRF World Road Statistics 1997 and 1999, 1997 World Bank Atlas, UN 1997 Statistics, NHTSA Traffic Safety Facts edition

Table A2 Asia and the Pacific

		Reported									GNP (US$ 1997)	
	Year	*Fatality definition*	*Fatalities*	*Injuries*	*Fatality index*	*MV in use 1996*	*Reported fatality rate*	*Population 1996 ('000s)*	*Reported fatality risk*	*Motor -isation level*	*Per capita*	*Total (millions)*
Bangladesh	1996	7	2,041	3,301	0.38	458,700	44.5	121,671	1.7	3.8	362	44,090
Bhutan	1992	30	6	14	0.30	14,000	4.3	715	0.8	19.6	441	315
Brunei Darassalam	1996	n/a	65	363	0.15	167,618	3.9	290	22.4	578.0	-	
Cambodia	1996	n/a	176	1,517	0.10	522,425	3.4	10,275	1.7	50.8	308	3,162
China	1995	7 **	71,495	154,734	0.32	27,356,000	26.1	1,215,414	5.9	22.5	868	1,055,372
Fiji	1994	365	88	1,165	0.07	90,000	9.8	803	11.0	112.1	2,499	2,007
Hong Kong	1996	30	263	18,879	0.01	516,804	5.1					
India	1995	30	59,927	307,089	0.16	29,534,000	20.3	945,121	6.3	31.2	378	357,391
Indonesia	1995	1	10,990	21,814	0.33	14,454,809	7.6	197,055	5.6	73.4	1,124	221,533
Korea, Republic of	1996	3	12,653	355,962	0.03	11,990,882	10.6	45,545	27.8	263.3	-	
Laos	1994	n/a	200			251,580	7.9	4,726	4.2	53.2	407	1,924
Malaysia	1996	30	6,304	47,171	0.12	7,449,053	8.5	20,565	30.7	362.2	4,775	98,195
Mongolia	1996	n/a	275	1,032	0.21	90,982	30.2	2,516	10.9	36.2	397	998
Myanmar	1993	1	924			252,000	36.7	45,883	2.0	5.5	-	
Nepal	1996	30	807					22,037	3.7	0.0	221	4,863
Pakistan	1996	30	4,288	8,986	0.32	2,462,552	17.4	133,510	3.2	18.4	484	64,638
Papua New Guinea	1992	1	290	1,948	0.13	116,000	25.0	4,401	6.6	26.4	951	4,185
Phillipines	1996	1	645	3,989	0.14	2,674,972	2.4	71,899	0.9	37.2	1,229	88,372
Singapore	1995	30	225	6,718	0.03	639,546	3.5	3,044	7.4	210.1	33,454	101,834
Sri Lanka	1995	30	1,916	16,824	0.10	770,000	24.9	18,300	10.5	42.1	808	14,781
Taiwan	1996	1	2,990	2,939	0.50	14,036,434	2.1					
Thailand	1996	1	16,782	43,541	0.28	17,666,202	9.5	60,003	28.0	294.4	2,761	165,659
Tonga	1995	n/a	10	7	0.59	1,920	52.1	97	10.3	19.8	1,825	177
Turkey	1996	n/a	5,428	104,599	0.05	5,182,035	10.5	62,697	8.7	82.7	3,179	199,307
Vietnam	1996	7	5,581	21,556	0.21	5,245,000	10.6	75,355	7.4	69.6	319	24,008
Western Samoa	1993	3	10	106	0.09			172	5.8		1,157	199
Countries w/ RTC data	26		204,379	1,106,119	0.156	141,943,514		3,062,094			801	2,453,010
Cook Islands												
Democratic Korea								22,451				
Kiribati								82			927	76
Maldives						7,980		256			1,176	301
Marshall Islands								57			1,702	97
Micronesia								109			1,954	213
Narau												
Niue												
Palau								17				
Solomon Islands								389			900	350
Tuvalu												
Vanuatu						8,000	0.0	173			1,376	238
Countries w/o RTC data	12							23,534			54	1,275
Regional total	38					141,959,494		3,085,628			795	2,454,285

China motor vehicles (1994)

Data sources: IRF World Road Statistics 1999 and 1997, 1997 World Bank Atlas, Journal of Traffic Medicine, Nepal's DOR's TESU, RETA

Table A3 Central-Eastern Europe

		Reported									GNP (US$ 1997)	
	Year	*Fatality definition*	*Fatalities*	*Injuries*	*Fatality index*	*MV in use 1996*	*Reported fatality rate*	*Population 1996 ('000s)*	*Reported fatality risk*	*Motor -isation level*	*Per capita*	*Total (millions)*
Albania	1996	n/a	257	258	0.50	106,630	24.1	3,286	7.8	32.4	773	2,540
Armenia	1996	n/a	359	1,639	0.18	12,960	277.0	3,774	9.5	3.4	560	2,112
Azerbijan	1996	7	763	2,420	0.24	373,774	20.4	7,581	10.1	49.3	513	3,886
Bosnia and Herzegovnia	1996	30	199	2,487	0.07	107,101	18.6					
Bulgaria	1996	30	1,014	7,325	0.12	2,477,426	4.1	8,356	12.1	296.5	1,167	9,750
Byelarus	1996	n/a	1,730	7,492	0.19	1,578,606	11.0	10,298	16.8	153.3	2,144	22,082
Czech Republic	1996	30	1,386	37,917	0.04	4,711,039	2.9	10,315	13.4	456.7	5,230	53,952
Croatia	1996	n/a	721	16,182	0.04	967,148	7.5	4,771	15.1	202.7	4,054	19,343
Estonia	1996	30	213	1,547	0.12	489,411	4.4	1,466	14.5	333.8	3,342	4,899
Georgia	1995	n/a	494	1,977	0.20	496,130	10.0	5,411	9.1	91.7	860	4,656
Hungary	1996	n/a	1,367	23,845	0.05	2,945,914	4.6	10,193	13.4	289.0	4,489	45,760
Kazakstan	1996	3	2,732	14,400	0.16	1,342,008	20.4	16,471	16.6	81.5	1,294	21,317
Kyrgyzstan	1994	7	622	3,423	0.15	150,200	41.4	4,576	13.6	32.8	483	2,211
Latvia	1996	n/a	550	4,324	0.11	488,523	11.3	2,490	22.1	196.2	2,408	5,995
Lithuania	1996	30	667	5,223	0.11	901,263	7.4	3,709	18.0	243.0	2,254	8,360
Macedonia	1996	n/a	154	3,397	0.04	304,464	5.1	1,980	7.8	153.8	1,105	2,187
Poland	1996	30	6,359	71,419	0.08	11,250,900	5.7	38,618	16.5	291.3	3,597	138,909
Republic of Moldova	1995	n/a	544	3,069	0.15			4,327	12.6	0.0	456	1,974
Romania	1996	Scene	2,845	7,716	0.27	3,146,000	9.0	22,608	12.6	139.2	1,406	31,787
Russia	1996	7	29,468	207,846	0.12	20,636,900	14.3	147,739	19.9	139.7	2,673	394,861
Slovakia	1996	30	640	11,624	0.05	1,291,733	5.0	5,343	12.0	241.8	3,706	19,801
Slovenia	1996	30	389	7,758	0.05	778,223	5.0	1,991	19.5	390.9	9,819	19,550
Tajikstan	1993	7	604	2,685	0.18			5,927	10.2	0.0	339	2,010
Ukraine	1996	n/a	3,259	18,872	0.15			50,718	6.4	0.0	1,038	52,625
Yugoslavia	1996	n/a	1,276	19,052	0.06	1,960,905	6.5	10,574	12.1	185.4	-	
Countries w/ RTC data	25		58,612	483,897	0.108	56,517,258		382,522		147.7	1,652	631,946
Turkmenistan		7						4,598			650	2,987
Uzbekistan		7						23,228			1,043	24,236
Countries w/o RTC data	2							27,826			978	27,223
Regional total	27							410,348			1,606	659,169

Data sources: IRF World Road Statistics 1999 and 1997, 1997 World Bank Atlas, United Nations, PHARE Study,

Table A4 Latin and Central America and Caribbean

		Reported									GNP (US$ 1997)	
	Year	*Fatality definition*	*Fatalities*	*Injuries*	*Fatality index*	*MV in use 1996*	*Reported fatality rate*	*Population 1996 ('000s)*	*Reported fatality risk*	*Motor -isation level*	*Per capita*	*Total (millions)*
Argentina	1996	30	6,473	2,002	0.76	5,449,640	11.9	35,220	18.4	154.7	9,066	319,293
Bahamas	1991	n/a	50	1,598	0.03	128,500	3.9	284	17.6	452.5	-	
Barbados	1996	365	24	1,823	0.01	54,619	4.4	264	9.1	206.9	-	
Belize	1996	Scene	69	704	0.09	20,170	34.2	222	31.1	90.9	2,766	614
Bolivia	1995	Scene	220	2,054	0.10	428,478	5.1	7,588	2.9	56.5	997	7,564
Brazil	1996	30	26,903	323,295	0.08	26,069,000	10.3	161,365	16.7	161.6	4,859	784,044
Chile	1996	1	1,925	52,422	0.04	1,622,408	11.9	14,419	13.4	112.5	4,890	70,510
Colombia	1995	Scene	7,874	52,527	0.13	1,434,000	54.9	37,451	21.0	38.3	2,326	87,125
Costa Rica	1996	Scene	260	10,692	0.02	475,738	5.5	3,442	7.6	138.2	2,695	9,275
Cuba	1996	n/a	1,424	9,329	0.13	706,690	20.2	11,019	12.9	64.1	-	
Dominica	1995	n/a	367					74	495.9		3,041	225
Ecuador	1995	Scene	1,112	6,344	0.15	527,374	21.1	11,698	9.5	45.1	1,606	18,785
El Salvador	1996	n/a	656	8,590	0.07	212,584	30.9	5,810	11.3	36.6	1,842	10,704
Guyana	1995	n/a	166	1,824	0.08	7,072	234.7	839	19.8	8.4	807	677
Honduras	1995	1	523	1,843	0.22	201,000	26.0	6,101	8.6	32.9	725	4,426
Jamaica	1995	365	367	3,044	0.11	400,552	9.2	2,547	14.4	157.3	1,553	3,956
Mexico	1995	Scene	3,397	33,860	0.09	13,303,000	2.6	93,182	3.6	142.8	3,741	348,627
Nicaragua	1995	n/a	457	3,585	0.11	163,710	27.9	4,503	10.1	36.4	423	1,907
Panama	1996	30	416	8,961	0.04	285,640	14.6	2,674	15.6	106.8	3,131	8,373
Paraguay	1995	Scene	98	7,687	0.01	252,861	3.9	4,955	2.0	51.0	2,055	10,183
Peru	1996	Scene	2,163	3,270	0.40	8,662,289	2.5	24,288	8.9	356.6	2,622	63,672
Saint Lucia	1994	n/a	20	308	0.06	16,280	12.3	158	12.7	103.0	3,532	558
Trinidad and Tobago	1993	7	264	31,695	0.01	197,282	13.4	1,297	20.4	152.1	4,281	5,553
Uruguay	1996	Scene	693	1,863	0.27	207,742	33.4	3,203	21.6	64.9	6,255	20,035
Venezuela	1995	n/a	2,563	25,995	0.09	438,900	58.4	22,311	11.5	19.7	3,555	79,315
Countries with RTC data	25		58,484	595,315	0.09	61,265,529	9.5	454,914	12.9	134.7	4,079	1,855,421
Antigua and Barbuda								66			7,409	489
Dominican Republic	1993					611,623		7,964			1,776	14,148
Grenada								99			3,030	300
Guatemala	1993					199,000		10,928			1,517	16,582
Haiti	1993					53,000		7,336			390	2,864
Saint Kitts and Nevis								41			6,244	256
Saint Lucia								158			3,532	558
St Vincent & the Grenandines								112			2,429	272
Suriname	1995					59,400		432			1,259	544
Countries w/o RTC data	9							27,136			1,327	36,013
Regional total	34					123,454,081		482,050			3,924	1,891,434

Data sources:IRF World Road Statistics '97 edition, 1997 World Bank Atlas
IADB Review of Traffic Safety in Latin America and Caribbean Region, 1998

Table A5 Africa

		Reported									GNP (US$ 1997)	
	Year	*Fatality definition*	*Fatalities*	*Injuries*	*Fatality index*	*MV in use 1996*	*Reported fatality rate*	*Population 1996 ('000s)*	*Reported fatality risk*	*Motor -isation level*	*Per capita*	*Total (millions)*
Algeria	1993	n/a	3,678	35,717	0.09	1,505,000	24.4	28,734	12.8	52.4	1,529	43,927
Benin	1996	9 mos	412	2,970	0.12	295,830	13.9	5,632	7.3	52.5	395	2,227
Botswana	1995	n/a	410	5,247	0.07	66,330	61.8	1,480	27.7	44.8	3,426	5,070
Cameroon	1993	n/a	840	5,312	0.14	162,000	51.9	13,676	6.1	11.8	630	8,610
Cape Verde	1993	n/a	46	670	0.06	4,100	112.2	389	11.8	10.5	1,121	436
Central African Republic	1995	n/a	58	519	0.10	1,710	339.2	3,344	1.7	0.5	330	1,104
Chad	1993	n/a	22	427	0.05	29,640	7.4	6,611	0.3	4.5	246	1,629
Comoros	1994		11			14,000	7.9	505	2.2		414	209
Congo	1994	n/a	124	903	0.12	53,000	23.4	2,705	4.6	19.6	675	1,827
Ethiopia	1996	n/a	1,693	7,455	0.19	86,756	195.1	58,234	2.9	1.5	112	6,507
Gabon	1993	n/a	116	964	0.11	41,000	28.3	1,125	10.3	36.4	4,224	4,752
Ghana	1996		987	8,372	0.11	135,000	73.1	17,522	5.6	7.7	398	6,982
Guinea	1993	n/a	423	3,906	0.10	35,000	120.9	6,759	6.3	5.2	567	3,830
Kenya	1993	n/a	2,516	21,824	0.10	391,000	64.3	27,364	9.2	14.3	353	9,654
Lesotho	1993	n/a	326	1,650	0.16	37,620	86.7	2,023	16.1	18.6	676	1,368
Madagascar	1995	City	25	823	0.03	78,210	3.2	13,705	0.2	5.7	261	3,575
Malawi	1996	n/a	1,090	3,928	0.22	56,430	193.2	10,016	10.9	5.6	213	2,129
Mali	1994	City	72	797	0.08	44,550	16.2	9,999	0.7	4.5	266	2,656
Mauritius	1996	n/a	146	3,609	0.04	96,287	15.2	1,134	12.9	84.9	3,919	4,444
Namibia	1996		127	595		136,726	9.3	1,584	8.0		2,164	3,428
Nigeria	1993	n/a	8,958	22,882	0.28	1,379,000	65.0	114,568	7.8	12.0	291	33,393
Senegal	1995	n/a	791	8,783	0.08	123,949	63.8	8,534	9.3	14.5	560	4,777
Sierra Leone	1996	n/a	75	718	0.09	36,224	20.7	4,630	1.6	7.8	165	762
South Africa	1994	6 days	9,981	128,440	0.07	5,929,000	16.8	37,643	26.5	157.5	3,458	130,151
Swaziland	1996	n/a	290	1,659	0.15	66,188	43.8	926	31.3	71.5	1,575	1,458
Tanzania	1994	n/a	1,548	12,327	0.11	139,000	111.4	30,494	5.1	4.6	217	6,632
Uganda	1996	n/a	1,594	6,477	0.20	130,785	121.9	19,741	8.1	6.6	335	6,608
Zambia	1996	n/a	928	5,564	0.14	237,000	39.2	9,215	10.1	25.7	384	3,536
Zimbabwe	1996	Scene	1,205	18,070	0.06	717,000	16.8	11,248	10.7	63.7	730	8,208
Countries w/ RTC data	29		38,492	310,608	0.11	12,028,335		449,540			689	309,889
Angola						232,000		11,100			271	3,012
Burkina Faso						161,430		10,669			242	2,579
Burundi						37,240		6,423			144	924
Cote d'Ivoire						456,000		14,347			708	10,152
Democratic Rep. of Congo								45,234			115	5,201
Equatorial Guinea						2,040		410			1,083	444
Eritrea						5,940		3,698			230	852

Continued over

Table A5 (Continued)

		Reported								GNP (US$ 1997)	
	Year	*Fatality definition*	*Fatalities*	*Injuries*	*Fatality index*	*MV in use 1996*	*Reported fatality rate*	*Population 1996 ('000s)*	*Reported fatality risk*	*Motor -isation level*	*Per capita*	*Total (millions)*
Gambia						17,640		1,147			355	407
Guinea Bissau						12,740		1,094			241	264
Liberia						41,160		2,810			-	
Mozambique						12,350		18,028			133	2,405
Niger		License w/d				53,460		9,335			210	1,962
Rwanda		Declared				30,070		6,727			250	1,680
Sao Tome and Principe						5,580		135			296	40
Seychelles						9,100		77			6,974	537
Somalia								9,805			-	
Sudan								27,272			290	7,917
Togo						173,000		4,230			351	1,485
Tunisia								9,132			2,128	19,433
Countries w/o RTC data	20							184,005			328	60,387
Regional total	49					13,307,485		633,545			584	370,276

Data sources: IRF World Road Statistics '97 edition, 1997 World Bank Atlas, Zambia Country Report

Table A6 Middle East and North Africa

		Reported									GNP (US$ 1997)	
	Year	*Fatality definition*	*Fatalities*	*Injuries*	*Fatality index*	*MV in use 1996*	*Reported fatality rate*	*Population 1996 ('000s)*	*Reported fatality risk*	*Motor -isation level*	*Per capita*	*Total (millions)*
Bahrain	1996	n/a	57	2,257	0.02	176,164	3.2	599	9.5	294.1		
Cyprus	1996	n/a	128	4,516	0.03			740	17.3			
Egypt	1994	n/a	4,400	22,135	0.17	2,205,000	20.0	59,272	7.4	37.2	1,218	72,164
Iran	1995	n/a	2,963	29,509	0.09	5,049,585	5.9	62,509	4.7	80.8	1,738	108,614
Israel	1997	n/a	530	47,451	0.01	1,542,870	3.4	5,692	9.3	271.1	16,585	94,402
Jordan	1996	n/a	552	15,375	0.03	293,396	18.8	4,312	12.8	68.0	1,567	6,755
Lebanon	1994	n/a	328	3,032	0.10	1,358,450	2.4	4,079	8.0	333.0	3,408	13,900
Libyan Arab Jam	1996	n/a	1,080	7,750	0.12			5,167	20.9			
Morocco	1996	Interurban	2,807	57,285	0.05			27,020	10.4		1,272	34,380
Oman	1996	n/a	512	6,654	0.07	312,500	16.4	2,173	23.6	143.8		
Saudi Arabia	1994	n/a	4,077	32,133	0.11	2,935,000	13.9	19,409	21.0	151.2	7,390	143,430
Syria	1995	n/a	1,524	7,897	0.16	421,522	36.2	14,502	10.5	29.1	1,148	16,643
Yemen	1996	n/a	1,267	6,740	0.16	535,153	23.7	15,778	8.0	33.9	279	4,405
Countries w/ RTC data	13		20,225	242,734	0.08	14,829,640	13.6	221,252		67.0	2,236	494,693
Afghanistan						56,000		24,167				
Dijibouti								619				
Kuwait						693,000		1,590				
Qatar						190,000		658				
United Arab Emirates	1996	2,807		5,636		252,000		2,532				
Countries w/o RTC data	5							29,566			-	-
Regional total	18					16,020,640		250,818			1,972	494,693

Data sources: IRF World Road Statistics '97 edition, 1997 World Bank Atlas

Abstract

This report indicates that in 1999 between 750,000 to 880,000 people were killed in road crashes worldwide and 23 to 34 million injured. Officially reported fatalities underestimate the true extent of the problem and examples of under-reporting of road fatalities are provided.

A crude estimate of accident costs suggests a total global figure of about US$500 billion (1997). Trend data shows road deaths continuing to increase in developing regions of the world but falling in the highly motorised countries of western Europe, North America and Japan. Pedestrians are shown to be a particularly high risk group throughout Africa, Asia and the Middle East

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