



**Sustainable Transport:  
A Sourcebook for Policy-makers in Developing Cities  
Module 5b**

## **Urban Road Safety**

– revised January 2004 –



Deutsche Gesellschaft für  
Technische Zusammenarbeit (GTZ) GmbH

## OVERVIEW OF THE SOURCEBOOK

### Sustainable Transport: A Sourcebook for Policy-Makers in Developing Cities

#### What is the Sourcebook?

This *Sourcebook* on Sustainable Urban Transport addresses the key areas of a sustainable transport policy framework for a developing city. The *Sourcebook* consists of 20 modules.

#### Who is it for?

The *Sourcebook* is intended for policy-makers in developing cities, and their advisors. This target audience is reflected in the content, which provides policy tools appropriate for application in a range of developing cities.

#### How is it supposed to be used?

The *Sourcebook* can be used in a number of ways. It should be kept in one location, and the different modules provided to officials involved in urban transport. The *Sourcebook* can be easily adapted to fit a formal short course training event, or can serve as a guide for developing a curriculum or other training program in the area of urban transport. GTZ is meanwhile elaborating training packages for selected modules, being available from June 2004.

#### What are some of the key features?

The key features of the *Sourcebook* include:

- A practical orientation, focusing on best practices in planning and regulation and, where possible, successful experience in developing cities.
- Contributors are leading experts in their fields.
- An attractive and easy-to-read, color layout.
- Non-technical language (to the extent possible), with technical terms explained.
- Updates via the Internet.

#### How do I get a copy?

Please visit <http://www.sutp-asia.org> or <http://www.gtz.de/transport> for details on how to order a copy. The *Sourcebook* is not sold for profit. Any charges imposed are only to cover the cost of printing and distribution. You may also order via [transport@gtz.de](mailto:transport@gtz.de).

#### Comments or feedback?

We would welcome any of your comments or suggestions, on any aspect of the *Sourcebook*, by e-mail to [transport@gtz.de](mailto:transport@gtz.de), or by surface mail to:  
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*Sourcebook Overview and Cross-cutting Issues of Urban Transport* (GTZ)

### Institutional and policy orientation

- 1a. *The Role of Transport in Urban Development Policy* (Enrique Peñalosa)
- 1b. *Urban Transport Institutions* (Richard Meakin)
- 1c. *Private Sector Participation in Transport Infrastructure Provision* (Christopher Zegras, MIT)
- 1d. *Economic Instruments* (Manfred Breithaupt, GTZ)
- 1e. *Raising Public Awareness about Sustainable Urban Transport* (Karl Fjellstrom, GTZ)

### Land use planning and demand management

- 2a. *Land Use Planning and Urban Transport* (Rudolf Petersen, Wuppertal Institute)
- 2b. *Mobility Management* (Todd Litman, VTPI)

### Transit, walking and cycling

- 3a. *Mass Transit Options* (Lloyd Wright, University College London; Karl Fjellstrom, GTZ)
- 3b. *Bus Rapid Transit* (Lloyd Wright, University College London)
- 3c. *Bus Regulation & Planning* (Richard Meakin)
- 3d. *Preserving and Expanding the Role of Non-motorised Transport* (Walter Hook, ITDP)

### Vehicles and fuels

- 4a. *Cleaner Fuels and Vehicle Technologies* (Michael Walsh; Reinhard Kolke, Umweltbundesamt – UBA)
- 4b. *Inspection & Maintenance and Roadworthiness* (Reinhard Kolke, UBA)
- 4c. *Two- and Three-Wheelers* (Jitendra Shah, World Bank; N.V. Iyer, Bajaj Auto)
- 4d. *Natural Gas Vehicles* (MVV InnoTec)

### Environmental and health impacts

- 5a. *Air Quality Management* (Dietrich Schwela, World Health Organisation)
- 5b. *Urban Road Safety* (Jacqueline Lacroix, DVR; David Silcock, GRSP)
- 5c. *Noise and its Abatement* (Civic Exchange Hong Kong; GTZ; UBA)

### Resources

6. *Resources for Policy-makers* (GTZ)

### Further modules and resources

Further modules are anticipated in the areas of *Driver Training*; *Financing Urban Transport*; *Benchmarking*; and *Car Free Days*. Additional resources are being developed, and an Urban Transport Photo CD-ROM is available.

# Urban Road Safety

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The **German Road Safety Council (DVR)** was founded in 1969 as a non-profit organisation. The objective of the organisation is to support measures aimed at improving the traffic safety of all road users. The main emphasis is given to issues related to engineering, education, legislation and enforcement. DVR coordinates the different activities of its members, develops programs and adapts them to new challenges and research findings.

The **Global Road Safety Partnership (GRSP)** is an informal network of businesses, civil society organisations and relevant government departments. GRSP members have been identifying ways in which they can act together to improve road safety globally. The International Federation of Red Cross and Red Crescent Societies host the GRSP Secretariat at its headquarters in Geneva, Switzerland. GRSP aims to find more effective and innovative ways of dealing with road safety in developing and transition countries. Through a comprehensive approach to road safety, GRSP partners collaborate and coordinate road safety activities. This approach aims to build the capacities of local institutions and enhance the ability of professionals and communities pro-actively to tackle safety problems.

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## 1. Introduction

Rapid urbanisation in developing countries presents tremendous challenges to the transport systems of expanding cities if they are to meet the access and mobility needs of their communities and provide them with a sustainable, safe and healthy environment. It is estimated that urban populations in developing countries will grow at more than 6% per annum and that, within a generation, more than a half of the developing world's population, and a third of its poor, will live in cities (World Bank, 2002). To meet this expansion, many developing world cities are increasing the capacity of their road networks, but often at the expense of the safety of the vulnerable road users. As a result many people die and are injured unnecessarily in road crashes, with the consequential social, economic and health burdens imposing heavy constraints on sustainable development.

In 1999, around 800,000 people died around the world as a consequence of road crashes, and 25 to 35 million persons were injured. Almost 86 percent of the crashes occur in developing countries, although these countries own only around 30 per cent of the world's vehicle fleet. Figure 1 illustrates the much higher fatality rate, per vehicle, in developing and transition countries. These tragic outcomes occur predominantly in urban areas, where around 680,000 persons died and more than 18 million were injured. The majority of road casualties (injuries and fatalities) in developing countries are not motor vehicle occupants, but pedestrians, motorcyclists, bicyclists and non-motorised vehicle occupants. As poor people rely heavily on these modes of transport, this group is particularly affected by road crashes.

Road deaths were ranked ninth as a cause of disability adjusted years of life lost in 1998, and are expected to be ranked third by the year 2020. Increasingly, road crashes reduce social welfare. The World Bank estimates that developing countries lose around 1.5 per cent of their GDP in road crashes (fatalities, injuries, damages), i.e. more than 67 billion. Also, around 35 percent of pedestrian fatalities are children. The UN World Health Organization Director-General, Gro Harlem Brundtland, stated in

1999 that “we stand on the brink of a massive transition in global health”:

*Today, three conditions contribute disproportionately to the global burden of disease: respiratory diseases, diarrhoea, and perinatal conditions. It is a familiar landscape which has not changed much for the last 50 years ... Looking ahead to 2020 the picture will change. The three leading causes of lost years of healthy life are likely to be heart disease, depression and road accidents (WHO, 1999).*

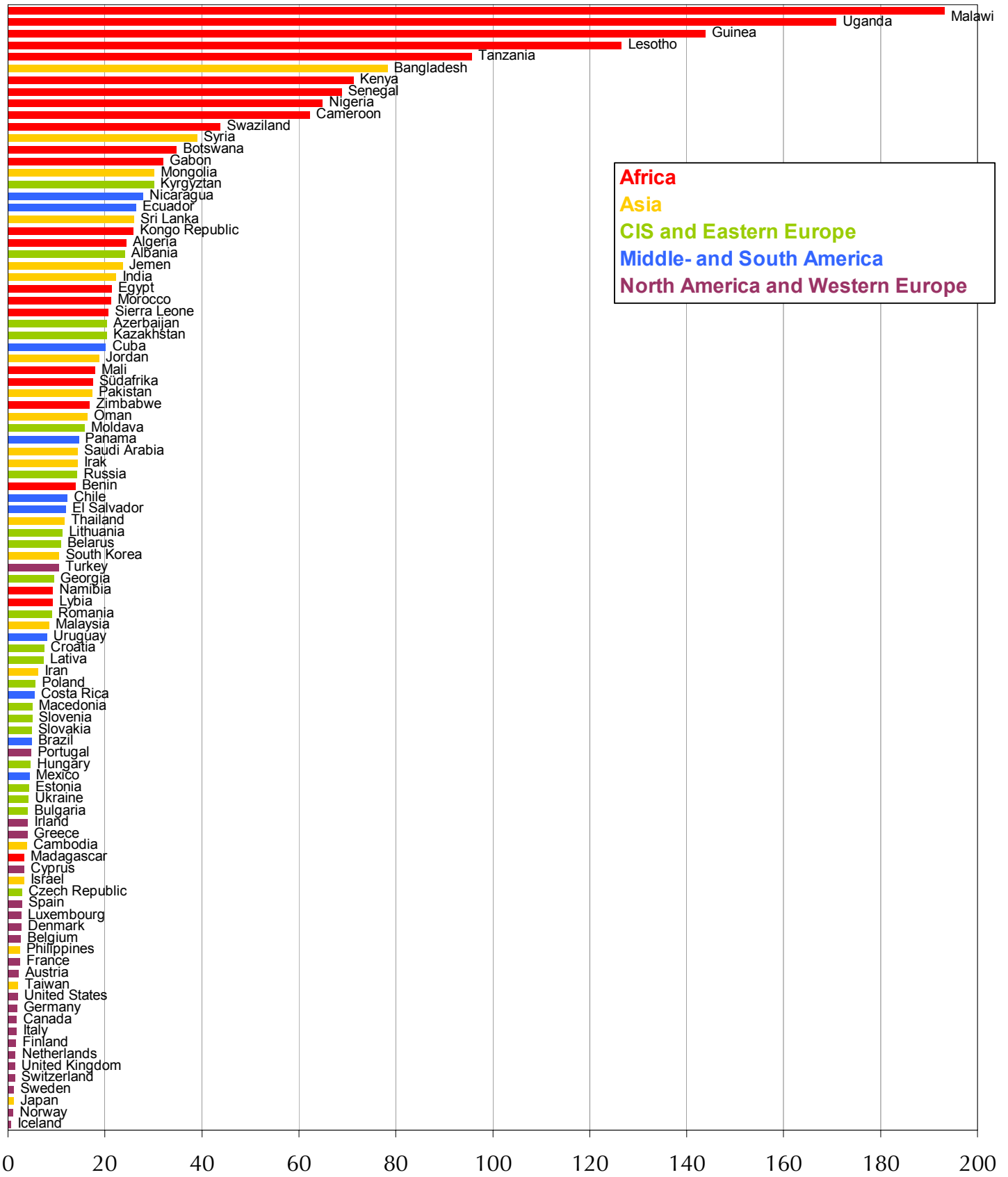
The role of local authorities in reducing road casualties is crucial. However, despite the need to improve road safety, a comprehensive road safety strategy often is not on top of the local political agenda. Difficult political decision-making processes, other issues such as the management of traffic flows, spatial and urban planning, economic and financial problems often hinder local authorities in taking steps to improve road safety. Nevertheless, all local authorities, whether or not they have a statutory responsibility for road safety, must recognise that they play a key role in reducing road casualties through their statutory functions and their local influence. An urban safety management strategy should be developed which focuses on reducing the number and severity of road crashes within the context of the development and transport goals of the local authority.

Road safety activities at the local level should:

- Understand and consider the local situation and circumstances;
- Make specific provision for vulnerable road user groups such as pedestrians, cyclists, children, elderly people, and look at concrete measures that are able to tackle their problems in the urban environment;
- Encourage safer road user behaviour and enforce traffic laws; and
- Improve the road safety situation on a short and medium-term basis with measures that are easy to implement.

Widely acknowledged strategies to improve urban road safety include:

- Co-ordinating road safety policies (Section 2 of this module);
- Assessing the problem and setting targets for casualty reductions; (Section 3);
- Creating a safer road environment (Section 4);



People killed in road accidents per 10000 vehicles

- Raising public awareness and improving education (Section 5);
- Traffic law enforcement to encourage safe road user behaviour (Section 6);
- Promoting use of safer vehicles (Section 7);
- Providing assistance to road crash victims (Section 8);
- Sound financing of road safety policies (Section 9);
- Integrating all of these elements into a “comprehensive road safety policy” (Section 10).

All road safety activities should be monitored to ensure that the money is being spent effectively and lessons are learned about the most and least successful measures and schemes. Monitoring of an action plan must focus on whether the objectives are being achieved.

## 2. Organisation of local road safety

International experience shows that two aspects of road safety make it difficult to manage road safety effectively. First, road safety involves a great number and variety of organisations to cover all aspects of road safety issues. Local public authorities responsible for traffic management and road maintenance and construction (public works), the police, school administrations, civic and advocacy groups at the local level, health care providers, emergency medical services, the local private sector and, last but not least, concerned citizens are the key players in improving safety on the road.

Secondly, the various organisations do not usually have road safety as their primary objective. Hence, road safety activities often get

neglected. In order to overcome these difficulties, local authorities should make maximum use of their influence in support of road safety promotion. Therefore, they should ensure co-ordination between the various disciplines, institutions and organisations involved. Only if a community takes

ownership of the road safety issue, can changes take place.

Two different approaches have been developed to organise road safety at the national level. One approach favours the establishment of a “National Road Safety Council” (NRSC), the other names a Lead Agency among the various institutions involved. Both approaches, however, aim at allocating responsibility at national, regional and local level and creating ownership. Given the multi-faceted and multi-level nature of road safety, co-ordination of road safety is essential (GRSP 2001, Road Safety Management, Information Note 1).



**Fig. 2 ▲**  
*A busy street scene in Delhi, with a broad mix of types of road users.*  
 GRSP

**Fig. 1 ◀◀**  
*International comparison of the ratio between people killed in road accidents and vehicles. The developed countries have better values than most developing or transitional countries. Note however that data on road traffic deaths, and the numbers of registered vehicles are of poor quality, with both often under-recorded. While this figure gives a general indication of the position in different countries, the data must be treated with caution.*

International Road Federation - World Road Statistics 1999

The U.S. National Highway Transport Association, for instance, has developed the "Safe Communities Approach", where all partners participate as equals in developing solutions, sharing successes, assuming risks and building a community structure and process to continue improvement of community life through the reduction of injuries and costs (<http://www.nhtsa.dot.gov/safecommunities>).

Depending on the size and the magnitude of the road safety problem, working groups, road safety units or commissions can be established to exchange information, to design a strategic urban road safety plan or programme, and to implement the measures and activities.

A strong link between the police authorities and the local agencies related to road traffic management and road building and maintenance should be established to exchange information about crash sites and characteristics. Road safety units have been established, for example, in Fiji, where they work successfully in the identification of black spots and dangerous sections of the road network and the development of site treatments, such as low cost engineering measures or targeted law enforcement.

Local politicians play an important role when decisions related to road safety strategies and the implementation and financing of road safety measures have to be taken. The local administration should therefore keep up a continuous dialogue with these representatives to raise their own awareness of the issue.

Co-operation between the public authorities and the non-public sector has been successful especially in the field of information, education and awareness raising. Volunteer road safety organisations support campaigns and educational programmes, primarily at the local level. Public-private pilot projects supported by the Global Road Safety Partnership (GRSP) related to children's safety in Warsaw and Bucharest are good examples of sharing road safety responsibilities .

The design of a road safety plan which allows the participation of all major stakeholders should be elaborated by identifying areas that need improvement (UN ESCAP, 2001). Goals have to be set and partners agree to them. Too

many and too ambitious, or even unrealistic, goals would undermine the motivation of all participants, but realistic targets can be a powerful motivation. A step by step approach is recommended. It is important to focus plans on the most vulnerable groups, such as children, elderly, poor and non-motorized transport users in general, and to keep the plans simple.

### Estimating global road fatalities

Source Jacobs et al (2000) "estimating global road fatalities"  
TRL Report 445. TRL. Crowthorne. UK

WHO World Health Statistics 1996 include examples of under-reporting. For example, only one out of every five medically reported road deaths appeared in police statistics in the Philippines. In Indonesia in 1995 insurance companies reported 37% more road deaths than the police, and in Taiwan the Dept of Health in 1995 reported 130% more than the police. In Karachi, in 1998, a study estimated that only 56% of road deaths appeared in police statistics and a study in Bogotá in 1998 found that only 27% of the mortuaries' road fatalities were recorded as road fatalities in the police system.

## Traffic fatalities increasing in poor countries

*Adapted from Kristian Pladsen, World Business Council for Sustainable Development, Sustainable Mobility News, 10 Jan. 2002*

Traffic accidents are a major cause of death and injuries worldwide, but while declining in the developed world, fatalities are still on the rise in many developing countries.

The close correlation between health and economic growth was recently unveiled in a report from the World Health Organization (WHO). A commission chaired by the US economist Jeffrey Sachs claims that each 10 percent improvement in life expectancy spurs between 0.3 and 0.4 percentage point rise in growth rates.

Road accidents turn out to be a substantial cause of death in many areas of the world, according to the Mobility 2001 report issued by the Sustainable Mobility Project. Toward the end of the 1990s, between 80,000 and 90,000 people were killed each year in road accidents in Western Europe and North America. In some countries, road accidents are the primary cause of death in the 15- to 30-year-old age group.

Still these numbers seem low when measured against traffic fatalities in developing countries. A few examples: The city of Bangalore suffered from 16.1 traffic fatalities per 100,000 people in 1995, compared to 18.3 per 100,000 in Brazil in 1995 and 33.3 per 100,000 in Johannesburg (1991/92). In comparison the G7 countries in 1996 had 0.6-1.6 traffic fatalities per 100,000 people.

The trends are also highly dissimilar throughout the regions of the world. During the last decade all industrialized countries have experienced substantial abatements in traffic fatalities – down 25% in Western Europe and 30% in the US. Safer vehicles and highway designs and better post-accident care are among the reasons.

In contrast, words like “unacceptable” and “dangerous” are used to describe the situation in the developing World – and the situation appears to be deteriorating. Low-income countries suffer some 80 times more traffic fatalities per vehicle than high-income countries (albeit the difference in fatalities-per-capita is less severe). Pedestrians and cyclists are generally disproportionately represented among accident victims – and so are poor people. The lack of institutional, engineering and infrastructure interventions are evaluated as more important explanations than merely the number of cars. Lack of driver training, public education and insufficient law enforcement are other reasons behind the tragic statistics.

## 3. Assessing the problem

Assessing the road safety problem at the local level requires a clear understanding of the numbers, distribution and characteristics of crashes and casualties and of the physical and social environment within which the solutions must be developed. Crash and casualty data are commonly collected by the police but there is an acknowledged problem of under-reporting. The extent of this is much greater in developing countries, so the scale of the problem is often very much larger than revealed by police statistics (see text box “Estimating global road fatalities”). Given this, it is often useful to collect overall road casualty data from several sources, particularly in the health sector, in order to supplement police data.

However the data collected by the police is usually the only source from which detailed information about the nature of individual crashes can be obtained, and this data is essential for detailed analysis of problems at specific locations in order to design remedial measures. Police report forms should permit the collection of data related to:

- the location of each crash (for example by map coordinates, road name, road class),
- the time - by year, month, day of the week, time of the day,
- the participants', casualties and vehicle details including age, sex, vehicle types (inc. pedestrians and animals),
- the outcome of the collision such as the severity of injuries and material damage,
- road conditions – such as junction type, signs, road markings, roadside obstacles,
- environmental conditions such as light and weather,
- a description including a collision diagram,
- other contributing factors such as alcohol use, traffic law violations, use of seatbelts or helmets.

Analysis systems should enable investigators to identify, for example, involvement of alcohol or excessive speed so that they can select the most appropriate countermeasures. Crash location maps have also proven to be a useful tool. They can be produced by using computer-based soft-

## Deaths per hour: 2.4

The severity of road safety problems in developing countries is illustrated by the following article. Many aspects mentioned in the article (e.g. cooperation between agencies) are discussed further in this module.

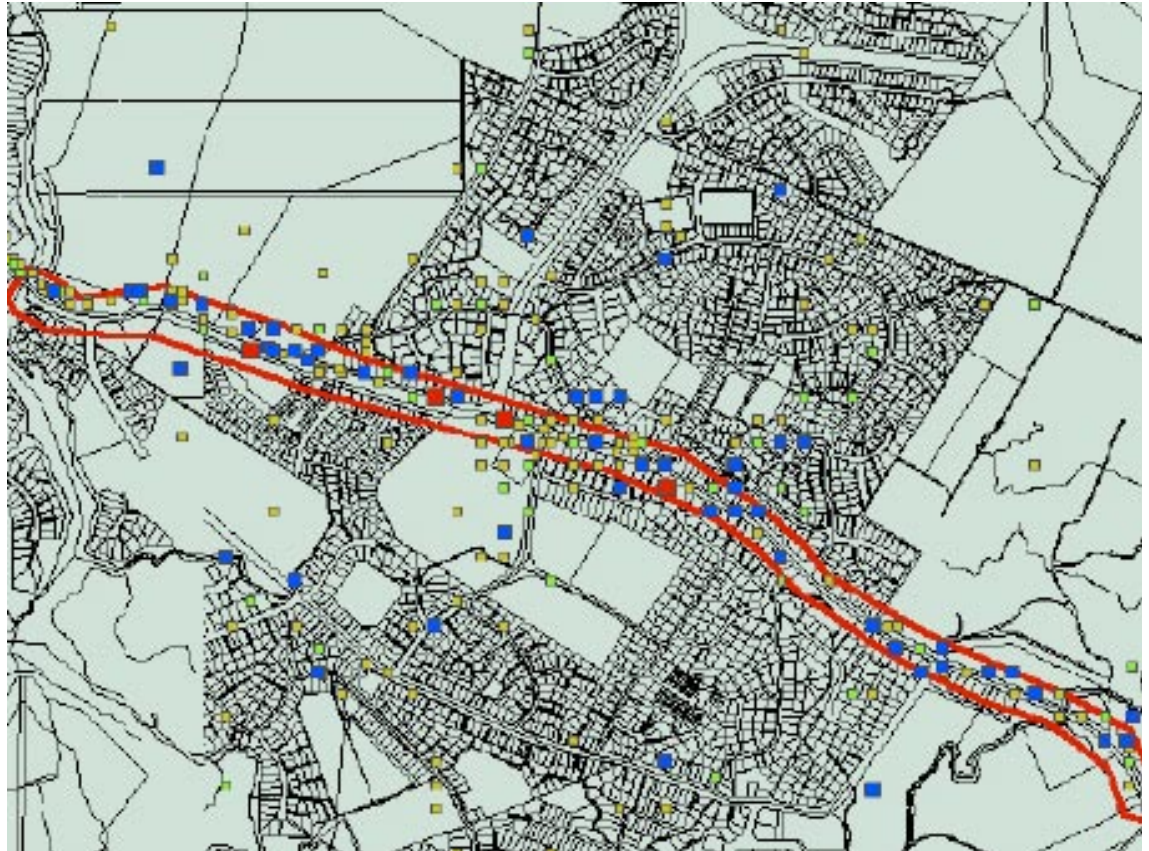
### Death toll hits 59 in mass exodus ahead of Thai holiday

BANGKOK, April 12 (AFP) - The death toll from road accidents hit 59 on Friday and 3,000 others have been injured as Thais stage the annual mass exodus from Bangkok to celebrate the traditional new year, officials said.

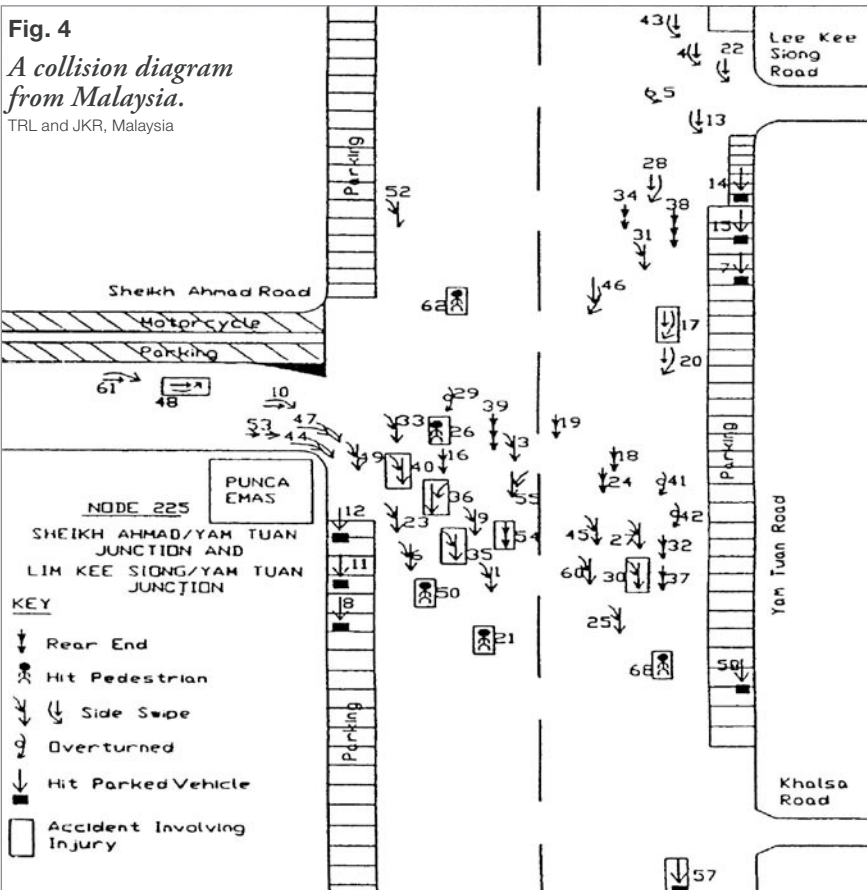
“As of now there has been an average of 2.4 people dying and 155 injured every hour,” Public Health Minister Sudarat Keyuraphan said in a statement after the first 24 hours of the toll count. In the hopes of curbing the fatalities that marred celebrations for the “Songkran” water festival every year, police have said that a drink-driving ban will be strictly enforced. National police and the public health and communications ministries have joined forces to set up 100 checkpoints across the country to test motorists for alcohol usage. If found to have imbibed, they face a jail term or a fine.

During last year's six-day Songkran festival some 530 people died and 32,014 were injured in road accidents. This year, public health officials are braced for the toll to rise to 600 (AFP, 12 April 2002).

**Fig. 3**  
*A crash location map in Fiji, from the TRL MAAP system.*  
 TRL and the Fiji Police



**Fig. 4**  
*A collision diagram from Malaysia.*  
 TRL and JKR, Malaysia



ware or in a less sophisticated manner, by using pins on a map showing the type and location of the accident. These maps allow identification of so called "black spots"; stretches or road sections with a concentration of crashes which may well be reduced by road engineering measures. With computerised records, modern software enables investigators to select crash records by location and to carry out in-depth analyses of the data (see Figure 3).

Another useful tool is a collision diagram (Figure 4), especially for dangerous locations where an accumulation crash records can be studied. They provide information about the driving direction and conflict situations such as turning to the left/right or pedestrian involvement. Common features in the diagrams for a specific site identify the particular problem which a remedial treatment should address.

The data should be supplemented by traffic and appropriate demographic information to achieve a comprehensive analysis which identifies higher than expected crash rates, or unusually high proportions of a particular crash type.

Site investigations are also crucial for identifying road problems and engineering solutions. The inspections should also be carried out during darkness at those places where crashes occur more frequently at night, to check whether the visibility or light conditions may contribute to the problem.

By creating a working group or commission (see margin note), composed of representatives of all local authorities involved in road safety such as the police, the traffic management authority and the road or highway authority, the exchange of information and the elaboration of proposals for short, medium and long-term solutions can be done in a multidisciplinary way. Additional representatives from the school authority or interest groups such as cyclists or market traders can be included as advisors in these commissions to obtain a better understanding about the risk situations which different road user groups have to grapple with.

### Road safety audit

Road safety audit has been mandatory on major national road schemes in the UK for a number of years. Australia, New Zealand, Germany, Denmark, The Netherlands and also Thailand have developed sound guidelines in this field, and the practice is spreading to low and middle income countries. The Public Works Department of the Government of Malaysia has developed, and uses, a particularly good set of road safety audit guidelines (JKR, Malaysia, 1997). These define road safety audit as:

“the formal examination of the planning, design and construction of a road project, and of the characteristics and operation of an existing road, by independent and qualified examiners, to identify any potentially unsafe feature or operational arrangement that may adversely effect the safety of any road user”.

It is important to recognise that this process:

- is formal and independent of the design and construction teams,
- is done at various stages in the planning and design process,
- is carried out by properly qualified staff, and
- considers the safety of **all** types of road user.

## 4. Creating a safer road environment

The process of adapting the layout and use of roads and footways in urban areas to manage the exposure of road users to risk will be in many cases a lengthy one. At every stage in this process, the responsible authorities should be taking all practicable and affordable steps to reduce casualties in the prevailing situations and to contribute to their further reduction in the longer term. Short term measures should address the existing transport system as a whole to reduce the number of collisions and injuries. Longer term measures must consider the planning and development issues surrounding the growth of the urban area and focus on policies that prevent the creation of new situations in which life and limb are put at risk. All new road proposals should be subject to a safety audit, by independent safety specialists (see text box).

For the treatment of black spots and parts of the urban road network which expose users to high levels of risk, low cost measures (Figure 5) have shown a great potential in reducing the number and severity of crashes. These short-term measures are easy to implement and often

### Establishing a road safety working group or commission

- Designate or elect a chairperson and determine what other executive officers may be necessary
- Decide how membership will be determined and how long members will remain involved
- Specify the length and frequency of meetings
- Determine the procedure for making decisions (consensus, majority vote, board decision)
- Determine roles and responsibilities for members
- Decide whether working sub-groups should be established and if they are based on functions (data workgroup, fund-raising committee, planning committee, public relation/communication) or by priority areas (safety belts, impaired driving).

Source: NHTSA-safe communities, <http://www.nhtsa.dot.gov>



**Fig. 5**  
*A combination of low cost measures described in Table 1 – better channelisation, medians and traffic signs, for example – could have averted this accident in Bangkok, Thailand, which was caused by confusion surrounding a contra-flow bus lane.*

Karl Fjellstrom, Dec. 2001

do not need long bureaucratic procedures (also see TRRL/ODA, 1991). Systematic analysis of collision diagrams and crash reports identify the features which should be improved. They often include:

- improvement of traffic signs,
- improvement of road marking and delineation (for example bus, motorcycle or cycle lanes),
- small construction measures which can be integrated in road maintenance activities such as improvement of the road surface.

Some countries report poor performance of road signs and markings, largely because of poor understanding and compliance by road users. Trials can help identify such potential difficulties, and integration with publicity and enforcement may help overcome poor compliance.

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***"Well-designed measures, based on analysis of crash records, have shown a great potential in reducing the number and severity of accidents, often at low cost."***

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It is important that road safety benefits are not arbitrarily ascribed to highway/road proposals or developments without an assessment of their casualty reduction potential. Therefore, all staff involved in the design and implementation of road improvement, maintenance and traffic management schemes should have an understanding of crash prevention principles and easy access to relevant data.

Pedestrians and cyclists are the most vulnerable road users. They are often at risk due to the conflicting use of the same road space by different types of road users, for example pedestrians using the roadway because of the absence of a sidewalk (Figure 6). Measures to benefit non-motorised transport users must be developed within broad traffic, environmental, economic and urban planning objectives (ETSC, 1999). In the UK, the Institution of Highways and Transportation suggest that the following hierarchy of measures should be considered before a design solution is chosen: traffic reduction, speed reduction, junction treatment, redistri-



**Fig. 6**  
*A road in Gaborone, Botswana without surfaced sidewalks. Pedestrians are forced to walk on the road after rain.*

Peter Koehler, Sept. 2001

bution of road space and provision of special facilities such as pedestrian crossing islands or cycle paths (IHT,1996).

Speed management in urban areas can play a decisive role in the reduction of the number and severity of accidents, since excessive and inappropriate speed is a major problem. The probability of a pedestrian fatality reduces from 85 per cent with an impact at 50 km/hr to less than 10 per cent at 30 km/hr. Speed management is not simply about reducing speed, but to a considerable extent about planning and designing the road layout and the road network in such a way that an appropriate speed is obtained. One of the key elements is the road and speed classification achieved by establishing a road hierarchy. A framework for the planning and evaluation process was developed in the European Dumas-Project (Report no. 168, published by The Danish Road Directorate) and describes the process from collecting and mapping data, setting targets, forming a speed management strategy, designing the programme, involving the public, and implementing and evaluating the programme.

The two boxes illustrate the economic returns from low cost engineering schemes, from analyses in the USA and the UK. Whilst the results are not necessarily directly transferable to developing world cities, they illustrate the potential which can be achieved by carefully designed schemes which target specific problems, as revealed by analysis of crash records.

Special attention should be given to road construction areas, where the risk of a crash is high. An appropriate arrangement of traffic signs and safety devices, as well as public information, is important to enhance awareness about the specific traffic circumstances.

### First year rates of return for local authority road safety schemes in the UK

On behalf of the UK Department for Transport, the Transport Research Laboratory (TRL) maintains a database of local authority road safety schemes (the MOLASSES database). These are generally low cost schemes which address known problem locations. Table 1 below presents the average first year rates of return by type of scheme. A total of almost 2,000 schemes are included in this analysis. The average cost of all schemes was GBP 23,400, with an overall average first year rate of return of 372%.

**Table 1: Local authority road safety schemes in the UK – first year rates of return by type of scheme.**

Gorell and Tootill (2001) "Monitoring Local Authority road safety schemes using MOLASSES" TRL report TRL512, TRL, Crowthorne, UK

Rank	Measure	First year rate of return %
1	Bend treatment (revised signs and marking)	722
2	Priority junction	523
3	Route treatments	520
4	Cycle schemes	444
5	Overall link improvements	276
6=	Signalised junction	266
6=	General link treatments	266
8	Link traffic calming	260
9	Pedestrian facilities	246
10	Area-wide schemes	225
11	Roundabouts	176

## 5. Raising public awareness and road safety education

Public awareness campaigns have one or more of three goals:

- to inform the public of the nature of problems and to prepare for change (e.g. in the law),
- to change attitudes,
- to change behaviour.

If the general level of knowledge about road safety issues is low then it is important to provide information which both raises awareness of the issues and provides a background against which more specific changes – for example in legislation and/or enforcement – are more likely to be accepted by the general public. Research in the highly motorised, high income countries shows that road safety publicity campaigns, by themselves, have only limited impact on attitudes and behaviour. However, when combined with other activities, especially law enforcement, the combined approach can reduce the number and severity of injuries.

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*"Combined with enforcement, road safety publicity campaigns improve road user behaviour and reduce road crashes."*

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There is little evidence about the impact of publicity campaigns in low and middle income countries, but it seems reasonable to assume that the lower the level of knowledge, the more likely it is that a campaign or education will be of benefit, especially if combined with legislation and enforcement. Also, to raise public awareness towards a safer traffic behaviour takes time and can only be successful if the messages are repeated periodically. Therefore, it is crucial to link awareness raising measures to specific problems, and to a target group. It is also important to have a clear objective and to evaluate the impact of the measure.

GRSP has published guidance on road safety publicity campaigns which stress the linkage between campaigns and enforcement. The guidance stresses the importance of clearly defining the problem, setting out the objectives of the campaign and evaluating its impact.



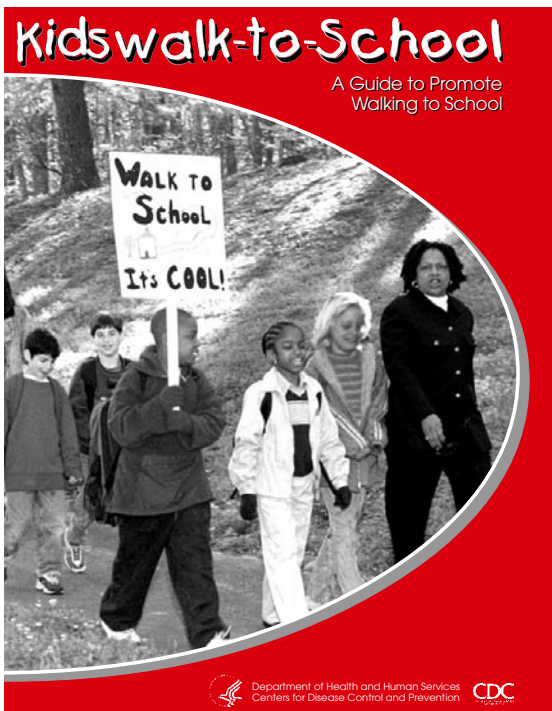
▲ Fig. 7

*The government in Bogotá has supported many creative initiatives to promote road safety, including this 'road safety' game on Car Free Day.*

Karl Fjellstrom, 07 Feb. 2002

Means of raising awareness include various public communication tools such as public information in the media, road side information, road safety events (Figure 7), educational measures (driver education, traffic schools for children), "Walk-To-School" events (see Figure 8), and so on. As Figure 8 illustrates, such events often involve a large number of related governmental and civil society organisations. Whilst these activities are widespread, there is debate about their effectiveness. They are rarely subject to evaluation, in part because they usually are part of a package of road safety measures and it is impossible to attribute any changes in crash or casualty numbers to such activities in isolation.

Road traffic schools (Figure 9) are used in a number of countries to raise public awareness about road safety through educating children. They aim to teach school children better traffic behaviour, although there is debate about their effectiveness. In Germany, for instance, they have been used since 1949 in cooperation with the German Shell company, school authorities and the police. This model has been transferred, for example, to the city of Montevideo, where a children road safety school provides theoretical and practical education. Theoretical education on traffic rules and behaviour is complemented by practical exercises in a learning area that is especially prepared for this purpose, usually within the school ground or a nearby property. The main emphasis, however, is placed on the training and testing of the children as cyclists. The system of road traffic schools in Germany is part of the official school traffic education and is included in the curricula of the third and



▲ Fig. 8

*Events like the US "Kids Walk to School Day" are supported not just by the Dept. of Health and Center for Disease Control, but also by a range of road safety oriented organisations including federal agencies (DOT National Highway Traffic Safety Administration), national organisations (National Safe Kids Campaign, National Safety Council), state, county and city agencies (Washington Traffic Safety Commission), research organisations (Florida Traffic Safety Education Program, Uni. of North Carolina Highway Safety Research Center), local advocacy organisations (Pedestrians Educating Drivers about Safety - PEDS Atlanta, Georgia) and international agencies (Safer Routes to School, Dorset, England).*

Kids Walk-to-School, US Department of Health and Human Services, <http://www.cdc.gov/nccdphp/dnpa/kidswalk.htm>



▲ Fig. 9

*Children's traffic school in Gaborone, Botswana.*

Peter Koehler, Sept. 2001

fourth school year. Shell provides the children's traffic schools with bicycles, helmets, traffic signs and, together with the police and the school authorities, is involved in the improvement of the educational program.

The involvement of children in crashes, particularly while travelling to and from school and in the vicinity of their homes, is often the subject of considerable local concern. The development of "safer routes to school" can be effective in improving both children's and parents' awareness and understanding of road safety problems, and by making journeys to school safer. These kinds of projects are undertaken in cooperation between parents, school staff and local traffic authorities and have been implemented in many countries and cities around the world. Safe routes to school plans are developed to find the roads or pedestrian roadsides which are the safest for children, to provide a context for local improvements to the road and footway network, to provide pedestrian crossings to improve safety and also to identify those parts of the road network which should be avoided. Information concerning the traffic flow, junctions and pedestrian crossings are gathered as well as the location of bus stops and public transport services.

Road safety training can also be beneficial for adult road users. Employers have found that there is both a business and a social benefit in providing training to their employees, particularly those responsible for valuable vehicles carrying valuable cargoes. Major oil companies, such as Shell and BP, have led the way in this respect in low and middle income countries where more employee lives were lost in road traffic crashes than from other types of industrial accident. Training courses have been developed for car, bus and truck drivers as well as for motorcyclists.

In Argentina, a safety course for truck drivers developed by the German Road Safety Council within a German Government funded road safety project was presented, including theoretical and practical modules which were translated and adapted to the local needs. Local authorities (the ministry) have provided an unused airport for the training sessions and Mercedes Benz Argentina (DaimlerChrysler) supported the course by lending two trucks. This kind of

course can also be a first step towards the creation of an institutionalised licensing system for truck drivers, which often is lacking in developing countries.

The increased use of seat belts by car, bus and truck occupants has a great impact on the reduction of the severity of the injuries due to crashes. In many developing countries, particularly in Asia, motorcycle use is widespread, and the use of helmets offers substantial road safety benefits.

Use of occupant and rider protection (seat belts, helmets) is an area where the importance of linking publicity, legislation and enforcement is vital to achieve the maximum safety benefit. Unfortunately, however, experience to date shows that decision-makers in most developing cities tend to give insufficient attention to these aspects of road safety, and in particular to protection of more vulnerable road users (Figure 10).



**Fig. 10**

*Many developing cities have a diverse mix of motorised and non-motorised transport modes, moving at various speeds, often at high volumes within a shared, narrow right-of-way, as this photo from Suzhou, China shows. This poses particular road safety challenges, but police and transport agencies in developing cities instead tend to focus on how to assist motor vehicle traffic – often resulting in greater hazards for slower moving, non-motorised traffic.*

Karl Fjellstrom, Jan. 2002

## 6. Enforcing safer road user behaviour

Strong, but fair and targeted, enforcement is critical to the safe and efficient use of urban road systems. A substantial safety benefit can be achieved if road users are deterred from committing traffic offences. The presence of an effective police force which is seen to enforce the law if it is broken, is a primary means of ensuring safe road user behaviour. The examples of seat belt and helmet wearing cited in the previous section are good examples of this. Other critical aspects of behaviour where substantial road safety benefits can be achieved if properly controlled are vehicle speeds and drunk driving.

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*"Traffic law enforcement requires professional skills that are different from other types of police work."*

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The main objective of enforcing traffic regulations is to deter violations and thus ensure road safety, not to maximise the number of infringement notices issued. Police activities should primarily increase road users' perception of the likelihood of illegal behaviour being detected, and of being penalised if they are caught. Traffic law enforcement requires professional skills that are different from other types of police work, so the training of police officers therefore plays an important role.

Detection and deterrence can only be achieved if the law is specific about its sanctions. As urban road legislation varies from country to country, the main strategy should consist of combining enforcement activities (mainly speed and alcohol controls, helmet and seat belt wearing) with information and awareness raising measures. The involvement of civic and advocacy groups in this area is needed to raise consciousness towards the consequences of drink-driving or not wearing a helmet or seat belt.

Excess and inappropriate speed is a common traffic offence. There is a strong body of evidence which demonstrates that the risk of a crash, and the severity of its consequences, increase with vehicle speed. The development of a speed management strategy is a common strand of road safety policy in cities of high income

countries, and law enforcement is a critical element of such a strategy. Two approaches of enforcement have been traditionally used: the stationary enforcement method generally involves an observation unit more or less hidden at the roadside and an apprehension unit, clearly visible, at which point speeding drivers are stopped. The mobile method is the enforcement from a moving unmarked or marked police car. The stationary method is much more cost-effective, and is recommended here. In recent years the introduction of speed camera technology has been highly cost-effective in developed countries, but only if they are used in the right way, which means putting the cameras in high risk locations. (ETSC, 1999). Radar detection may be more appropriate in low and middle income countries if they do not have the capacity to make use of the evidence provided by cameras and to bring offenders to court.

Local police authorities should adopt a road safety policy and the operational objectives should be coordinated with local/urban road safety plans. Urban Traffic and Transport Authorities should support the police in the introduction of technological aids for traffic law enforcement. As with many aspects of road safety, the coordination of activities by the various actors is essential for maximum benefits.

## 7. Promoting the use of safer vehicles

As vehicle safety standards are generally set at governmental level, or imposed *de facto* by the standards of imported vehicles, local authorities should ensure that all vehicles owned or operated by companies or under contract are maintained to standards of safety, especially those safety-relevant parts such as braking systems, steering system, lamps and tyres.

Increasingly, developing countries are adopting inspection & maintenance and roadworthiness regulations (see Module 4c: *Inspection & Maintenance and Roadworthiness*). A comprehensive inspection, maintenance and roadworthiness system requires close co-operation between vehicle roadworthiness inspection teams, trained vehicle mechanics and workshops (to guarantee vehicle repair according to safety standards), and traffic police (to enforce vehicle inspection). In most cases, technical vehicle inspection is complemented by vehicle emission testing, in order to meet the rising need for air quality measures to reduce pollution from mobile sources. A comprehensive inspection, maintenance and roadworthiness system distinguishes between private cars, heavy goods vehicles and public service vehicles. Heavy goods and public service vehicles, due to their more frequent use, should be inspected more frequently than private cars.

Overloading (Figures 11 and 12) is a serious problem in developing countries, related to the technical specifications of vehicles. Each vehicle has a maximum carrying capacity, which depends on the structural strength of the chassis and is usually linked to the strength of roads and bridges in a country. If this capacity is exceeded, vehicles may not react correctly in critical situations. The problem of overloading should be kept under special surveillance by the traffic police or vehicle inspectors. This is not only a safety issue, as overloaded vehicles cause disproportionate damage to roads and impose substantial economic burdens on the authorities responsible for maintenance. Thus limiting overloading is important both from a road safety perspective and to protect a city's investment in its road infrastructure.



Fig. 11 ▲

*Overloading is a major cause of crashes. The front wheels of a truck loaded with bamboo trunks in Bangladesh (top) barely touches the ground, while an overloaded truck in Amritsar, Punjab, India is a serious hazard.*

Rainer Kuhnle (Bangladesh); Manfred Breithaupt (Amritsar)



Fig. 12 ▲

*In order to control overloading, traffic police in Tangail District, Bangladesh use mobile measuring units ('mobile courts').*

Rainer Kuhnle

## 8. Providing assistance to road crash victims

The health consequences of road crashes can be influenced by preventive actions before the crash (active safety), during the crash (passive safety) and after the crash (rescue, treatment and rehabilitation).

The health services are usually only involved after the crash, but appropriate management of road casualties following the impact is a crucial determinant of the chance and quality of survival. Improvements in the immediate treatment of victims and emergency rescue systems have a great effect on road safety. When organised ambulance systems are absent, as is generally the case in low and middle income countries, effective first aid at the crash site and appropriate handling of injured people, are important (Figure 13). Efforts should be made to educate the public and those commonly involved in the transport of casualties (such as taxi drivers) in the basic actions that can be taken to preserve life and to avoid further injury to victims by inappropriate handling.

Local authorities and employers can support first aid training both for staff and the general public. The growing use of mobile telephones, even in countries without historic investment in cable-based telephone systems, offers an opportunity to develop a system of fast access to the emergency services through a telephone number which ideally operates throughout the country. By providing basic first aid training to police, fire services and other rescue personnel who are likely to attend road crashes, victims will have a greater chance of survival.



► Fig. 13  
First aid at a crash site  
in Côte d'Ivoire.  
IFRC

## 9. Sound financing of road safety policies

Without sound financing mechanisms, no serious road safety measures can be implemented or sustainably maintained. At national level, the major funding sources are:

- budget lines for road safety in the relevant Ministries, drawn from general tax revenues,
- levies added to insurance premiums,
- traffic fines dedicated to road safety activities,
- a certain percentage of road user charges,
- private sponsorship.

At local or municipal level, particularly important are traffic fines, private sponsorship, and local public budget line complemented by national public funding, for financing road safety activities. (see also GRSP, 2001).

In most countries, however, road safety is regarded as a public sector responsibility, and hence relies on state funding. In such cases a financial provision specifically allocated to road safety should be integrated into the urban transport or roads budget. It should be dedicated not only to road infrastructure measures, but also consider traffic law enforcement linked to financial support for publicity campaigns and public relations. Depending on the local government responsibilities it may also include elements for emergency services and education. The amount of the budget will depend on the local authority's objectives, as specified in the local road safety plan.

In funding and implementing an urban/local road safety plan, the local authorities should seek to maximise funding contributions from those parties who benefit from the measures within the plan – primarily road users. This is why levies on motor insurance or local sales tax on fuel have an obvious appeal as they link directly to use of the road system, and provide a potential source of revenues which will grow in proportion to traffic in the city.

Private sector companies also will benefit from safer roads on which to operate, and from an improved corporate image by investing in local road safety activities. Large commercial organisations such as banks, trading and oil

companies are often willing to support road safety activities as part of their social obligations. For community-based road safety awareness activities, the sponsorship of local vehicle traders, insurance companies (vehicle insurance and medical care), and transport operators can support the work of local non-governmental organisations by providing support for education and information materials such as flyers, posters, and so on.

Whilst sponsorship has been used in some countries for many years to support road safety activities, it is generally ad hoc and not sustainable. More recently the development of a partnership approach, lead by the Global Road Safety Partnership, has brought together government, business and civil society to address road safety issues. Such tri-sector partnerships add value in a number of ways. They raise the

political profile of road safety. They bring the skills and resources of the private sector to bear. They engage the community through NGO organizations such as the local Red Cross or Red Crescent society. The experience of GRSP is that more can be achieved by working together in this way (see text box and Figures 14 and 15).

### A high profile road safety program in Bangalore

In the Indian city of Bangalore, GRSP is working with a local partnership organisation – the Bangalore Agenda Task Force (BATF) – created by the Chief Minister to make Bangalore the ‘best’ city in India.

#### Engagement of police in the program

In road safety, BATF brings together the city authorities, local businesses and the public to deliver effective road safety projects such as a publicity and enforcement campaign against drinking and driving. Engaging the police in the program was a vital step, as campaigns are known to be much more effective when linked with appropriate enforcement. The legal limit for blood alcohol whilst driving in India is particularly low by international standards (0.3), although the law is widely abused, as revealed by surveys in Bangalore before this program was initiated.

#### “Partnership approach”

The partnership approach which has been adopted has enabled a high profile campaign with widespread support from the police, local government and the business community to be undertaken. A systematic evaluation of its impact is being undertaken and results are expected mid-2003.



**Fig. 14** ▲  
*Launch of Bangalore drink driving campaign.*  
BATF



**Fig. 15** ◀  
*Breath tests being administered in Bangalore.*  
NIMHANS (National Institute of Mental Health and Neuro Sciences), Bangalore

## 10. Towards a comprehensive road safety policy

The preceding elements of a sound road safety policy must not be seen as isolated or arbitrary items. Rather, they form the building blocks of an integrated policy. Integrating these elements is a pre-condition for successful road safety activities. In this way national and international experience can play a significant role when local authorities set their goals and plan the steps to be taken.

Many countries seek the advice of international initiatives, such as the Global Road Safety Partnership (GRSP), the European Traffic Safety Council (ETSC), or national agencies such as the German Road Safety Council (DVR). The latter, for instance, is established and financed by the state (45 percent by Ministry of Transport), and by the private sector (55 percent by insurances, transport companies, etc.). These institutions provide forums for discussion, the dissemination of information, best practices and lessons learned.

Finally, a Comprehensive Road Safety Policy begins with good examples set by those who wish to improve the road safety situation. Therefore, all participants in the road safety policy are expected to respect traffic rules and otherwise exhibit good conduct in traffic, both during and outside their working hours. A safety culture is a part of everyday life. As long as this is neglected by authorities and their staff, there will be no real change. How many more lives have to be lost on the world's roads?

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