



The Road Safety Cent

Management and Financing of Road Safety in Low-Income Countries



The Road Safety Cent

Findings, interpretations, and conclusions expressed in this document are based on information gathered by GTZ and its consultants, partners, and contributors from reliable sources. GTZ does not, however, guarantee the accuracy or completeness of information in this document, and cannot be held responsible for any errors, omissions, or losses which emerge from its use.

Imprint

Author: Dr. Gunter Zietlow

Editor: Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH
P. O. Box 5180
65726 Eschborn, Germany
<http://www.gtz.de>

Division 44, Environment and Infrastructure
Sector Project "Transport Policy Advisory
Service"

Commissioned by
Federal Ministry for Economic Cooperation and
Development (BMZ)
Division 313 – Water, Energy, Urban Development
Friedrich-Ebert-Allee 40
53113 Bonn, Germany
<http://www.bmz.de>

Editing: Armin Wagner
Armin.Wagner@gtz.de
<http://www.gtz.de/transport>
<http://www.sutp.org>

Cover photo: Armin Wagner
Safety on the way to school, Bamako/Mali, 2006

Layout: Klaus Neumann, SDS, G.C.

Copyright: ©GTZ – "The Road Safety Cent 2006"

Eschborn, 2006

Executive summary	1
1. Introduction	2
2. Problem identification	4
3. Institutional framework	5
4. Financing	7
4.1 Road user charges	7
4.2 Other income from road users	11
4.3 Contributions by private sector	12
4.4 Development loans and grants	12
4.5 How much should be spent on road safety?	13
5. Lessons learned	17
References and resources	19

Executive summary

Road accidents are a leading cause of death and injury worldwide. About 1.2 million people die in road accidents every year. Almost 85% of road deaths occur in Low-Income Countries (LIC). Apart from humanitarian aspects of road safety, road accidents have serious social and economic implications. The total direct and indirect cost of road accidents is estimated at about US\$880 billion or 2% of the world's GDP in the year 2005. Estimates for different countries range from 0.5–5% of GDP. Road users can save a lot of money and pain by spending only a fraction of these costs on road accident prevention.

The main reasons for the poor road safety records in developing countries are:

- Lack of awareness of the road safety problem in the public, the political and the professional arenas;
- Lack of institutional capacity and of adequately trained and motivated staff; and
- Insufficient funding of road safety measures.

It is necessary to solve all three problems. In LIC the funding problem seems to be the most difficult one to overcome and needs to be tackled first in combination with road safety awareness campaigns. Without a stable and sufficient flow of funds for road safety, any attempt to solve institutional problems is bound to fail.

Since road users are the ones that cause most of the road accidents and bear the consequences, they are the ones that benefit most by paying for road safety improvements. Measures to improve road safety, including proper enforcement of road safety laws and regulations, can be best financed through a Road Fund or a Land Transport Fund, as for example in New Zealand.

Alternatively, road safety engineering measures, including Black Spot Improvements, can be financed through road construction and maintenance budgets, while road safety programmes are best financed by applying a road safety surcharge of about 1 US-Cent per litre of motor fuel or 5–10% of vehicle insurance premiums, complimented by public and private sector contributions. LIC with very high accident rates might need two to three times as much. Although vehicle insurance premiums best



reflect road accident risks, surcharges on motor fuel seem to produce better results since they are less subject to evasion in LIC.

Road safety programmes can be managed effectively and efficiently by road safety funds or road safety councils on national and local levels as long as they have a sound legal basis, strong oversight by a private-public board, sound financial management, funding based on direct user charges, and regular technical and financial audits.

International and bilateral donors can play an important role to initiate and assist LIC to implement the necessary reforms of financing and managing road safety. Therefore, all road projects financed by the donor community should have a component to improve road safety, not only on the project level, but on the road sector level as well.

Fig. 1

About 1.2 million people die in road accidents annually. Bicyclists are vulnerable road users.

Photo: Changzhou, Manfred Breithaupt

1. Introduction

Road accidents are a leading cause of death and injury worldwide. About 1.2 million people die in road accidents every year. Almost 85% of road deaths occur in Low-Income Countries (LIC). While road accident levels are falling in most of the High-Income Countries (HIC), they are increasing in LIC with levels up to 100% higher than in industrialized countries with low road accident rates (see Figure 3). In LIC, the poor are disproportionately affected, with most of the victims being pedestrians, bicyclist, motorcyclists, and passengers of public transport riders and with more than half of them between 15 and 44 years old. Up to 50 million people are injured, many suffering life-long disability.

about US\$880 billion or 2% of the worlds GDP in the year 2005. Estimates for different countries range from 0.5–5% of GDP (see Table 1).

Most of the cost of road accidents is borne by road users. In New Zealand, for example, of the total estimated direct and indirect annual cost of road accidents and incidents of US\$2 billion, 79% or US\$1.6 billion is born by road users. This amount is equivalent to 13% of the total

Table 1: Estimates of economic costs of road crashes

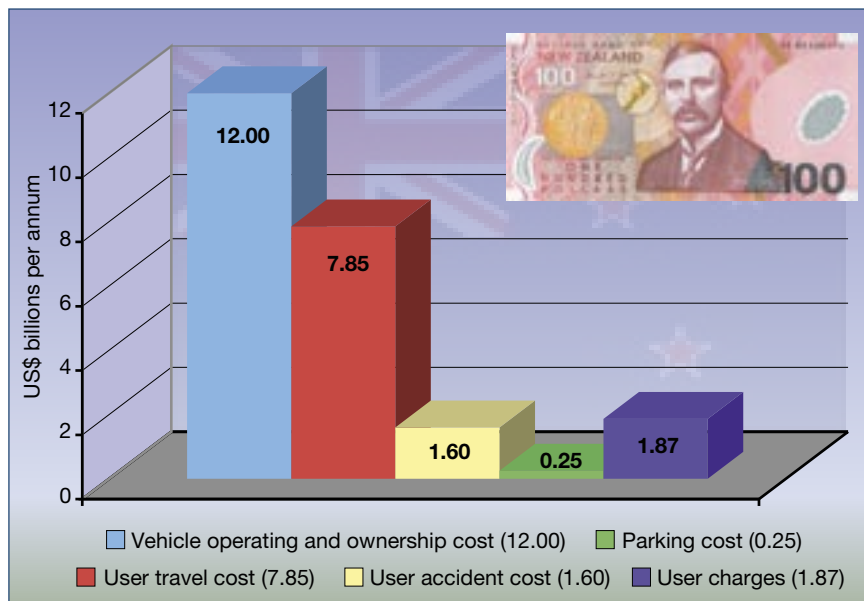
Country	Study year	Costing method	GDP [%]	Indicative annual cost in million US\$ based on 2005 GDP
Brazil	1997	HC	2.0	15,880
Germany	1994	HC	1.3	36,166
Malawi	1995	HC	>5.0	> 100
Nepal	1996	HC	0.5	37
New Zealand	1991	WTP	4.1	4,469
Tanzania	1996	HC	1.3	156
Thailand	1997	HC	2.3	4,077
UK	1998	WTP	2.1	46,032
USA	1994	WTP	4.6	572,930
Zambia	1990	HC	2.3	165

Source: Jacobs, Aeron-Thomas, and Astrop; 2000

Note: HC stands for “gross output” or “human capital” method (well suited to the objective of maximising the wealth of a country) and WTP stands for “willingness to pay” method (suitable for social welfare maximisation and for the use in cost-benefit analyses). The later normally yields higher percentages since it is based on social welfare maximization. Cost estimates for 2005 have been added, assuming that percentages have remained constant, which might not be the case.

Fig. 2
Total costs experienced by road users in New Zealand in 2001/02.

Source: Ministry of Transport, New Zealand, 2005



Apart from the humanitarian aspects of road safety, road accidents have serious social and economic implications. The total direct and indirect cost of road accidents is estimated at

vehicle operating and ownership cost of US\$12 billion per year, excluding travel time cost (see Figure 2).

The tremendous importance of road safety to the economy and especially to the road users who bear most of the road accident costs makes it necessary to pay special attention to improve road safety worldwide. This is especially true for LIC who have substantially higher accident levels than HIC.

People killed in road accidents per 10,000 vehicles

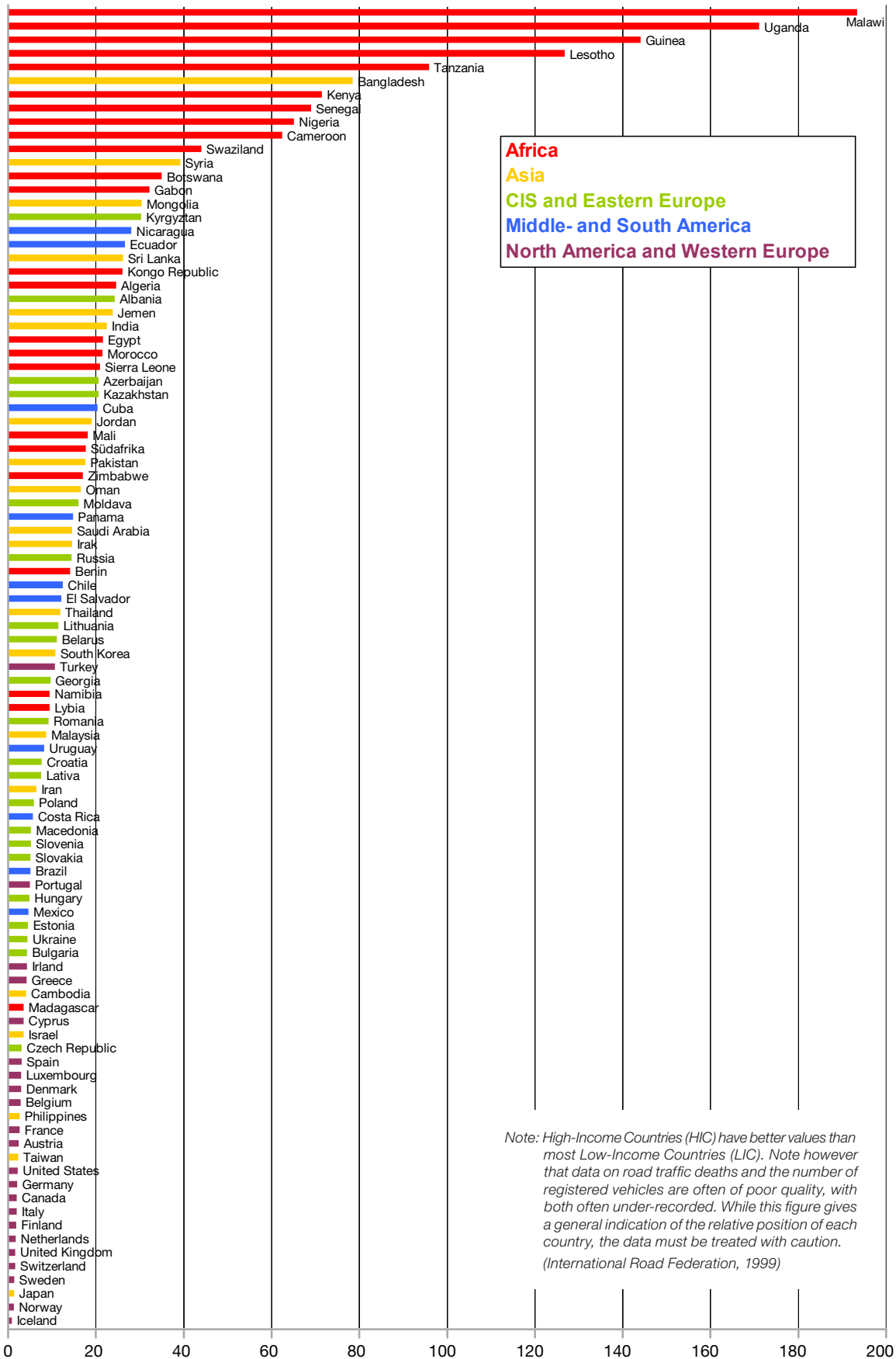


Fig. 3
International comparison of the ratio between people killed in road accidents and vehicles.

Source: International Road Federation – World Road Statistics 1999

Note: High-Income Countries (HIC) have better values than most Low-Income Countries (LIC). Note however that data on road traffic deaths and the number of registered vehicles are often of poor quality, with both often under-recorded. While this figure gives a general indication of the relative position of each country, the data must be treated with caution.
(International Road Federation, 1999)

2. Problem identification

While HIC manage to lower their accident levels despite increasing motorization, most of the LIC not only face much higher accident levels but also experience an increase in the total number of road accidents and fatalities. Especially countries in Africa and Latin America as well as some countries in Asia are facing difficulties to cope with increasing road accident levels.

The main reasons for the poor road safety records in developing countries are:

- Lack of awareness of the road safety problem in the public, the political and the professional arenas;
- Lack of institutional capacity and of adequately trained and motivated staff; and
- Insufficient funding of road safety measures.

All three problems need to be solved. But the funding problem seems to be the most difficult one to overcome and needs to be tackled first in combination with road safety awareness campaigns. Without a stable and sufficient flow of funds for road safety, any attempt to solve institutional problems is bound to fail.

During the last decade several attempts have been made to improve the institutional capacity for road safety in LIC by either improving existing or creating new institutions for road safety with little success. Especially international and bilateral donors have helped to set up National Road Safety Commissions (NRSC) in countries like Bangladesh, Ethiopia, Fiji, Ghana, and Zambia. Except for Fiji, where the NRSC has secured a stable and secure flow of funds through a dedicated funding source, all other NRSC face severe funding problems, since they depend mainly on the government budgets. In Ethiopia and Zambia the situation is slightly better as they receive some funds from their National Road Fund.

Similar funding problems with respect to road maintenance have been, and still are, a major concern in several LIC. To improve financing of road maintenance so-called “second generation” road funds have been created, often with the help of international and bilateral donors. The key characteristics of these funds are as follows (World Bank 2006):

- Sound legal basis—separate road fund administration, clear rules and regulations;
- Strong oversight—broad based private public board;
- Agency which is a purchaser not a provider of road maintenance services;
- Revenue incremental to the public budgets and coming from charges related to road use and channelled directly to the Road Fund bank account;
- Sound financial management systems;
- Lean and efficient administrative structure;
- Regular technical and financial audits.

The Road Maintenance/Management Initiative (RMI) in Africa as well as the joint efforts of the German Technical Cooperation (GTZ), the World Bank, and the Inter-American Bank in Latin America, and the Road Fund Program undertaken by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) has helped to establish these second generation road funds in many LIC. Experiences reveal that road funds with a stable and sufficient funding and an effective and efficient management are the ones that perform best. Therefore, the best way of tackling road safety problems in LIC seems to follow a similar approach.

Fig. 4
Lack of infrastructure for pedestrians is a major obstacle to road safety.

Photo: Panama City, Lloyd Wright



Recently, several road safety initiatives have commenced in LIC, like the ones of the United Nations (United Nations 2005), the Global Road Safety Partnership (GRSP), the Global Road Safety Initiative (GRSI) that is funded by seven of the world's largest automobile and oil industry companies, the Asia-Pacific Economic Cooperation (APEC) forum, the African Road Safety Initiative of the World Bank (World Bank 1998), and many other road safety initiatives of multinational and bilateral donors. Especially the World Bank is supporting the creation of national road safety councils. All these initiatives are important to improve road safety worldwide and especially in LIC. Nevertheless, more emphasis is necessary to join forces and to focus more on securing a stable and secure flow of funds for road safety, besides solving the challenging institution problems.

3. Institutional framework

Road safety is a complex issue involving different elements of the society and the economy. Many organizations, public and private, national, regional and local are interacting in order to establish policies, plan, coordinate, and implement road safety measures, enforce road safety laws and regulations, attend to road accidents, treat accident victims, and settle road accident claims. While the government is ultimately responsible for road safety, all other organizations with vested interest in road safety need to be actively involved and coordinated. At the government level, the key Ministries dealing with road safety issues are:

- Transport and Public Works,
- Interior (Police),
- Health,

Box 1: Management structure of road safety in New Zealand

In 1993 New Zealand's Land Transport Safety Authority (LTSA) was established. The LTSA reports to a Board appointed by the Governor-General on advice of the Minister of Transport. The LTSA is charged with land transport safety at reasonable cost and manages the government's interest in safety of the road network, the national vehicle fleet, and the railways.

Funding for the LTSA primarily comes from road user charges. Direct funding to the organization is around US\$120 million per annum and comes from the National Roads Fund (41%), users of the transport system (55%) and the Crown Agent (4%). The National Roads Fund (Transfund New Zealand) receives money from road user charges, motor vehicle registration and licensing fees and a portion of the excise duties levied on petrol, LPG and CNG sales. Users of the transport system provide revenue in the form of driver license fees, safety standard levies and fees, rail fees, and the sale of road safety materials (see Land Transport Safety Authority 2004).

The Board of LTSA has 6 to 8 members all from private sector appointed by and reporting to the Minister of Transport. The organizational structure consists of five operational groups: Policy

and Planning, Partnerships and Programmes, Regulatory Services, Corporate Services, and People and Culture. At the national level, LTSA works collaboratively with the government transport sector, the wider government sector, and industry groups to develop practical land transport solutions. At the regional level, LTSA works with regional government, territorial local authorities and communities to ensure effective joint working relationships and to establish a common commitment to achievable transport solutions.

On December 1, 2004 Land Transport New Zealand (LTNZ) was formed to take the responsibility for land transport funding and promote land transport safety and sustainability, replacing Transfund New Zealand and LTSA. The move was a result of a new transport strategy to improve the government's role to operate in a more integrated and collaborative fashion (Transport Legislation Bill 2004).

Besides LTNZ, the Ministry of Transport oversees the Road Safety Trust that provides funding for road safety projects and research out of revenue received from the sale of personalized vehicle registration fees. The normal annual turnover is US\$3.2 million (Road Safety Trust 2005).

In addition, there are several local road safety organizations in New Zealand that can apply for financing of local road safety schemes through LTNZ or the Road Safety Trust.



Fig. 5
Poster on risky behaviour in public transport.

Photo: Bangladesh, Rainer Kuhnle

- Local Government,
- Education,
- Justice.

In most of the HIC the Ministry of Transport takes over the role as a lead agency with a department, agency, committee or council in charge of road safety. Choice of structure depends on local conditions and is often subject to changes to adjust to new conditions. Typically, coordination between the organizations with vested interest in road safety is done through Road Safety Committees, Councils or Advisory Panels. Different management structures seem to be effective as long as sufficient funding and qualified and dedicated staff is secured.

For example, New Zealand has a very effective and efficient road safety organization at government level with competent and dedicated staff and secure and sufficient financing (see Box 1). Annual road safety programs are based on a long-term safety strategy with clear and measurable performance targets that have been developed based on extensive consultation with all parties with vested interests in road safety (Safety Administration Programme 2005). Other HIC like the United Kingdom or Norway have effective and efficient road organizations that are financed mainly through the government budget.

Most of the LIC are in a less favourable position. Lack of institutional capacity and adequately trained and motivated staff and insufficient

funding are the norm rather than the exception. In addition, rules and regulations of the public administrative system often do not allow for an effective and efficient management of road safety at government level. Furthermore, experiences in LIC clearly reveal that, it is almost impossible to secure stable and sufficient flow of funds for road safety through general government budget financing procedures, especially if their allocation depends on the annual political debate (Zietlow 2005). Therefore, it is necessary to establish Road Safety Funds or Road Safety Councils that are run like a business and financed through road user charges. The characteristics of such Road Safety Funds should be: sound legal basis, strong oversight by a private-public board, sound financial management, funding based on direct user charges, and regular technical and financial audits (see Box 2). For those LIC who have a second-generation road fund, funding for road safety might be provided totally or partially by the road fund.

Besides a broad representation of organizations with vested interest in road safety at board level, it is important to actively involve relevant stakeholders in Technical Committees that deal with the different aspects of road safety. A sample legislation or government decree for the creation of a National Road Safety Council and its Secretariat can be downloaded from the World Bank's road safety website (World Bank).

Box 2: Main characteristics of a second-generation road safety fund

- Sound legal basis with a road safety fund administration and clear rules and regulations;
- Strong oversight by a board with qualified and powerful members from the private and public sector and representing all important groups with vested interest in road safety;
- Agency which is a purchaser not a provider of road safety works and services;
- Revenue incremental to the public budgets and coming from charges related to road use and channelled directly to the Road Safety Fund bank account;
- Sound financial management systems with lean efficient administrative structure;
- Regular technical and financial audits.

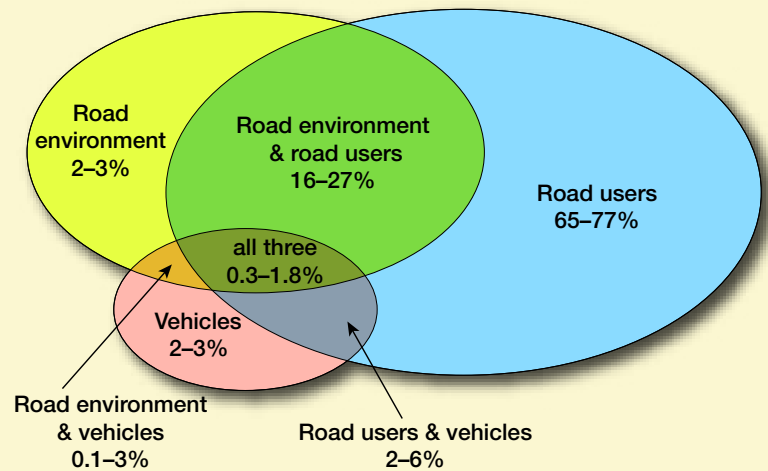
4. Financing

The most challenging issue regarding road safety is to establish a stable and sufficient flow of funds to finance road safety organizations and road safety works and services. Following the commercialization principle that is becoming more and more accepted worldwide, the ones who receive the benefits should pay for them. This means that road users should mainly finance road safety measures, since they are the ones who cause most of the road accidents (see Box 3) as well as suffer from their consequences.

Besides road users there are others that benefit from improving road safety such as insurance companies, manufacturers and distributors of road safety equipment, road safety engineering firms and consultants, and the society in general as fewer accidents will free money that can be invested in more productive investments and contribute to economic growth. In addition, the public sector saves on public health services as long as road accident victims are treated in public hospitals that do not receive compensation from road accident victims or their insurance companies. All of these groups have a vested interest in reducing road accidents and should contribute to finance road safety works and services. While it might be difficult to directly charge pedestrians and bicyclists, there are several options to charge owners/drivers of road vehicles and motorcycles.

To pay for using roads is not a new concept. Actually, road user charges are as old as roads themselves. For example, two hundred years ago private investors provided over 10,000 miles of toll roads in the United States of America. Later on the public sector got more and more involved in the provision and operation of roads and financing was done mainly through public budgets. To secure sufficient funding, road funds with earmarked revenue from fuel taxes have been established in many countries around the world. Unfortunately, many road funds in LIC, so called “first-generation” road funds, have been managed poorly and earmarking fell into disgrace in the 1980ies, when most of them were discontinued. Since almost 15 years a second generation of road funds (see Note in Figure 3) has been established in many coun-

Box 3: Percent contributions to roads crashes



The above graphic shows the contributions of road users, road environment, and road vehicles to road crashes. Road users alone are responsible for 65-77% of all road crashes, road users in combination with the road environment account for 16-27% of

road crashes, while road users in combination with the road vehicles account for 2-6% of road crashes. This means that road users are contributing to more than 90% of all road crashes (Sabey and Taylor 1980).



Fig. 6
Badly deformed car after accident.

Photo: Bangkok, Matthias Müth

tries in Africa, Latin America, and Asia. This has introduced a more commercial approach to road financing, where users are charged for the use of roads (Heggie and Vickers 1998).

4.1 Road user charges

Principally, road funds are an excellent way of financing road safety (see Box 4). Unfortunately, not all countries have well functioning road funds. And while most of the road funds in

LIC provide funds for road safety engineering measures, only few of them dedicate a significant part of their revenue to other road safety measures as well. The main reason is that most of them hardly receive enough funds to cater for all of their road maintenance needs, which are considered first priority. One alternative is to increase funding and dedicate a certain percentage of revenue to other road safety measures besides road safety engineering. For example, the Ethiopian Road Fund Board has recently proposed that up to 3% of the road fund could be allocated for road safety (Global Road Safety Partnership 2005). A second alternative is to create a separate Road Safety Fund that would need its own funding sources. Whatever alternative is chosen, charges in addition to the ones already collected from road users will be required.

The most common road user charges that can be used for financing road safety measures are road safety surcharges on motor fuel used on roads, surcharges on weight-distance charges, surcharges on compulsory vehicle insurance fees, surcharges on vehicle licensing fees, and surcharges on road tolls.

Road safety surcharges on motor fuel used on roads

Levies on motor fuels, like gasoline, diesel, ethanol blends, LPG, and CNG are typical sources to finance roads worldwide. Almost all governments finance their budgets partially through taxes on motor fuels. Expenditures for roads are normally paid from the budget. In general, there is no direct relationship between the amount of fuel taxes received by governments and the amounts paid for the construction, maintenance and operation of roads. In a few cases, a part of fuel taxes is earmarked for roads and either channelled through the Ministry of Finance or collected in separate accounts like in the case of New Zealand or the United States of America. Governments might be reluctant to increase the amounts they already directly or indirectly spent on road safety, as this would take away money from other sectors. On the other hand, increasing fuel levies will put government into another dilemma, as this will increase fuel prices, generally opposed by road users.

This is a similar problem governments face when they introduce road funds. Road users have to

Box 4: Financing road safety in New Zealand

New Zealand has had a road fund since 1953. It has been restructured several times, most recently in December 2004, when the fund was renamed “National Land Transport Fund (NLTF)”. The fund operates on the principle that road users will have to pay for the usage of roads. The proceeds are managed outside the government’s budget (*i.e.*, it is an off budget account). The revenue for the fund comes from:

- a portion of the fuel levy added to the price of gasoline, LPG and CNG,
- weight-distance charges paid by diesel vehicles,
- motor vehicle registration fees,
- interest earned on the fund account,
- revenues earned from sale of surplus, and
- refund of GST (the NZ equivalent of VAT).

Total expected 2005/06 annual revenue of the NLTF was estimated at about US\$1.27 billion. From the total amount US\$154 million was allocated for the Safety Administration Programme of the NZ Police, US\$21 million for the Safety Program administered by Land Transport New Zealand [LTNZ] (mainly to be used for improving road safety), US\$624 million for State Highways, and US\$342 million for local roads (to be complemented by US\$275 million from local government rates). A substantial part of the money allocated for roads is being spent on road safety engineering measures. All road safety works and services, is contracted based on competitive bidding, including the annual Police bid, and monitored against agreed outputs. Actual outputs are funded on their merits, using benefit/cost approach rationing criteria set down in a Project Evaluation Manual.

Besides LTNZ, the Ministry of Transport oversees the Road Safety Trust that provides funding for road safety projects and research out of revenue received from the sale of personalized vehicle registration fees. The normal annual turnover is US\$3.2 million.

Source: Road Safety Trust 2005

be convinced that paying additional fuel levies will actually save them money. For example, in a country with poor road conditions additional

Box 5: Financing road safety in Fiji

In Fiji, only five to six insurance companies provide motor insurance. Amounts that can be charged for third party insurance are controlled and have to be approved by the Commissioner of Insurance. With the establishment of the **National Road Safety Council (NRSC)** a “voluntary” levy of 10% of third party motor insurance premiums was introduced to finance the NRSC.

The Council has 14 regular and 10 co-opted members from the following organizations: Ministry of Works, Energy, Ministry of Education, Fiji Police Force, Land Transport Authority, Attorney General’s Camber, Fiji National Training Council, Insurance Council of Fiji, Fiji Motor Traders Association, Fiji Local Government Association, Fiji Chamber of Commerce, Ministry of Agriculture, Sugar & Land Resettlement, Ministry of Transport and Civil Aviation, Ministry of Tourism, Ministry of Health, Ministry of National Reconciliation, Information and Media Relations, Suva City Council, Fiji Taxi Union, Fiji Bus Operators Association, Fiji Mini Buses Association, Society of Fiji Travel Associates, Mobil Oil, and three individual members.

The income from the insurance companies provides about 60% of NRSC’s annual income, with further 10% being received from government (via services and facilities provided to NRSC headquarters). A further 30% is raised by the NRSC from commercial sponsorship (vehicle dealers, oil companies, and banks) and from fundraising.

Source: Asian Development Bank 2003

money spent on road maintenance will actually save road users 2 to 3 times the amount of the additional fuel levy (Zietlow 2005). But this implies that the additional fuel levy is exclusively spent on road maintenance in an effective and efficient manner. Similarly, road users might be willing to pay additional fuel levies for a Road Safety Fund as long as they are convinced that the benefits to them would be greater than the cost involved.

The main advantages of financing road safety through fuel levies are that these charges cannot be evaded by road users and reflect the risk of accidents better than levies on vehicle licensing fees.



Surcharges on weight-distance charges

Very few countries, like New Zealand or some of the states in the United States of America, are using weight-distance charges to collect road user charges from motor vehicles powered by diesel. This is to avoid the problem of the tax differential between diesel used for agricultural purposes and road vehicles. In New Zealand they are paid into the National Land Transport Account and partially disbursed to finance road safety engineering as well as other road safety programmes. Since weight-distance charges are recognized as genuine road user charges, it is much easier to justify a road safety levy.

Unfortunately, weight-distance charges are difficult to administer and are susceptible to evasion. Therefore, they are not recommended for use in LIC.

Surcharges on compulsory vehicle insurance fees

A few countries help to finance road safety activities by adding a levy or surcharge to compulsory third party motor vehicle insurance premiums (e.g., Finland, Switzerland, Slovakia, and South Korea). Finland began this approach some 50 years ago, with a levy of 1.1% of insurance premiums. State mandated levies range from 1–10%. In some countries insurance companies agree to contribute a certain percentage of premiums on a voluntary basis like in Fiji (see Box 5). As long as all insurance companies comply, it does not affect their competitiveness.

Fig. 7

Roadside police check.

Photo: Lesotho, Armin Wagner

Some state-owned insurers, who often enjoy monopoly power, actively invest in road safety. For example, the Transport Accident Corporation in Victoria (Australia) is required by law to invest in crash reduction and rehabilitation programmes (see Box 6). Although the law does not specify the amount, the Corporation spent US\$11.5 million in 2001. Likewise, the Canadian insurance company ICBC invested US\$40 million in 2000. In South Africa, the Road Accident Fund allocates 2.5% of its income to finance road safety interventions and in its early days the Fund supported law enforcement and speed reduction campaigns (Global Road Safety Partnership 2006).

To finance road safety through surcharges on compulsory third party insurance premiums has the advantage of having a good relationship between road safety user charges and road accident costs as long as insurance premiums reflect the individual drivers risk profile. Also, it gives some additional incentive to drivers to drive safely. However, for this concept to be effective, it would be necessary that all motor vehicles using roads would have to be insured. Unfortunately, in many LIC a significant percentage of motor vehicles are not insured. While the levels of compliance with compulsory third party vehicle insurance are very high in HIC, ranging from 90–99%, levels are fairly low in LIC ranging from 3–84% (see Table 2). Therefore, surcharges on motor vehicle insurance premiums are not an effective tool to finance road safety in countries with low compliance rates. Higher levels of compliance might be achieved by (a) requiring evidence of insurance before a vehicle can be licensed, (b) requiring all vehicles to carry a windscreen decal that shows that they are insured, or (c) collecting the insurance premiums as part of the annual licensing fees, as it is being done in Victoria, Australia.

Surcharges on vehicle licensing fees

Several states in the United States of America use surcharges to vehicle licensing and registration fees to help funding emergency medical services and trauma centres. For example, Virginia collects an additional fee of US\$4 on the annual motor vehicles registration fee to fund the State Emergency Medical Services (EMS), referred to as “Four for Life”. It also imposes a US\$3 fee on

Box 6: Financing of road safety in the State of Victoria, Australia

In the early 1980s, compulsory third party injury insurance was provided by a number of commercial companies in Victoria. All of them were losing money, premiums were rising constantly, and no attention was being given to accident reduction and rehabilitation of victims.

In 1985 Government legislated to create the Transport Accident Corporation (TAC). In 1987 the TAC came into being with broadly the following functions:

- to take over all outstanding road accident personal injury claims,
- to contain the spiral costs,
- to provide a “no fault” scheme,
- to invest in road safety to reduce trauma, and
- to actively rehabilitate the injured.

In 1992/3 TAC invested US\$57 million into road safety programmes, which was about 10% of premiums. These investments made significant contribution to TAC’s profitability by the accident reductions achieved, leading to reduced claims. In that period the benefit cost ratio of all investments in road safety was 5.1:1.

The TAC 1992/3 Annual Report stated that its savings in reducing accident claims amounted to US\$210 million since 1989, which was in excess of the amount it had invested in road accident programs over the same period.

In 1992/3 it invested in the following programmes:

Program	Amount (US\$ mln)
Media promotion and community awareness	10.7
Police breath test and speed camera	5.6
School traffic safety education	5.8
Research	0.5
Accident black spot programs	27.0
Road trauma centre	7.0
Total	56.6

In 1992/93, TAC operations were reviewed by international specialists, who reported that TAC compared favourably with private insurers in the major elements of business. The cost of insurance cover provided by TAC was US\$200 a year for a passenger car, which compared favourably with costs in other states of Australia.

Source: Asian Development Bank 2003

motorcycle registration fees for the Motorcycle Rider Safety Training Programme (Global Road Safety Partnership 2006).

Botswana’s main source of funding for its National Road Safety Council is a safety surcharge on motor vehicle registration. This surcharge was increased by a factor of five to approximately US\$1 some years ago. Papua New Guinea is also known to collect road safety funding through a surcharge on vehicle inspection stickers. Tanzania has reported considering a surcharge on motor vehicles to fund road safety (Global Road Safety Partnership 2006).

Unfortunately, licensing fees and inspection fees are frequently subject to evasion and abuse in LIC. Therefore, increasing fees may simply lead to even greater levels of avoidance. Surcharges on vehicle license fee are therefore not necessarily an effective way to finance road safety in LIC.

Surcharges on road tolls

Many countries around the world are using road tolls to finance at least part of their road infrastructure. These tolls are widely accepted as road user charges. Nevertheless, there are only few countries that are using levies on road tolls to finance road safety. In South Korea, for example, levies on the income of expressway authorities are used to partially finance the Road Traffic Safety Association.

As toll roads are becoming more and more popular in LIC, it might become more feasible

Table 2: Reported levels of compliance with compulsory third party vehicle insurance

Countries	Compliance (%)
High-Income Countries	
• British Columbia	98–99
• Sweden	98
• UK	90–95
Low-Income Countries	
• Costa Rica	84
• Ghana	70
• Peru	22
• Zambia	15
• Pakistan	3–5

Source: (Aeron-Thomas 2002)



to impose levies on road tolls to contribute to finance road safety.

4.2 Other income from road users

Some countries are rather inventive when it comes to raising funds for road safety. New Zealand, for example, is using personalized licensing plates to finance the Road Safety Trust (see Box 4). In Korea levies on tyre manufacturers profits are used to partially finance road safety. Other countries are using traffic fines to finance road safety. In Western Australia, one-third of the fines collected for red light and speeding violations caught on camera is paid into the Road Trauma Trust Fund. Seven States in the USA are using portions of traffic fines for law enforcement training. Surcharges are imposed on hazardous moving violations in two States, with Mississippi allocating the funds for emergency medical services and New Mexico is donating the money to a Traffic Safety Education and Enforcement Fund (Froning 1992). Vietnam is the only country known to allocate all of its traffic fines to road safety (Aeron-Thomas, Downing, Jacobs, Fletcher, Selby, and Silcock 2002).

Such other income from road users seems to be a good way of raising additional funds for road safety, but can only contribute minor amounts.

Fig. 8
Many accidents happen at night. Vehicles lack adequate lighting and hard shoulders are inappropriate.

Photo: Mauretania, Klaus Neumann



Fig. 9
A police officer organising traffic in Quito.

Photo: Quito, Manfred Breithaupt

4.3 Contributions by private sector

Many private businesses support road safety for their own direct benefit such as road transport operators, insurance companies, manufacturers and distributors of road safety equipment, and road safety engineering firms and consultants.

Others like oil companies and car and truck manufacturers like to benefit their corporate image or to brand their products as safe. They provide either funds or provide support in kind. These contributions tend to concentrate on (a) road safety education and knowledge transfer, (b) road safety campaigns, (c) enforcement campaigns, and (d) driver training and awareness (see Box 7).

Contributions to road safety by private business can play an important role in financing and implementation of road safety measures, but they cannot provide all the funds necessary for road safety.

4.4 Development loans and grants

Multinational and bilateral lending institutions and donors contribute to road safety by providing loans, grants, and technical assistance. Often these contributions form part of road sector programmes. In recent years, more attention has been given to improve road safety by assisting governments in creating National Road Safety Councils as well as financing various road safety measures, especially targeting pedestrians and non-motorized transport.

Box 7: Examples of private sector contributions to road safety

In the UK, BP developed a teaching resource pack “Living with Traffic”, which was produced to help with primary school safety education. In addition, BP’s own road safety team has been touring schools in the UK for some 30 years teaching road safety to primary school children.

Shell has funded road safety education for primary school children in Germany.

In Bangalore, 3M, Volvo, Getit Yellow pages, Coca Cola, Infosys, Koshy Holdings PVY Ltd., Tata, Synergy are all working together with the government and NGOs as part of the Road Safety Drive 2000 project.

In the UK, the Portman Group was established in 1989 by leading drinks manufacturers. The main aim of the organization is to tackle social problems associated with alcohol misuse, including drink driving.

In Delhi, Indian vehicle manufacturer Maruti Udyog Ltd. has sponsored Inceptor patrol vehicles. These patrol vehicles have played a prominent role in traffic law enforcement and resulted in a considerable increase in revenue from fines.

Honda established a Driving Safety Promotion Headquarters in 1970 in Japan, with the aim of *creating a better driving environment*. Six additional driver education centres have been established since in other parts of the country.

Shell Malaysia has been involved with the Emergency Motorcycle Unit (EMU) of the Malaysian Red Crescent Society. Volunteers in the EMU attend crashes and are able to get through traffic jams on a motorcycle where it would be impossible for a car or ambulance.

In Romania, 3M has been involved in highlighting the presence of vulnerable road users, such as cyclists, through the provision of retro-reflecting safety devices and markings.

Source: Global Road Safety Partnership 2006

Development loans and grants can help to raise awareness of road safety among government institutions, assist in initiating institution building, like the creation of National Road Safety Councils, and help to finance demonstration projects on road safety measures. But development loans and grants can only play an initiation and supplementary role in financing road safety.

4.5 How much should be spent on road safety?

Having identified the main sources of financing road safety, the question remains of how much is and should be spent to improve road safety. The answer to this question very much depends on how society, especially the road user, perceives the importance of road safety and what can be done to improve road safety effectively and efficiently.

While in most of the HIC road safety is given a high priority, there is a lack of awareness of the social and economic dimensions of road accidents in LIC. This applies to the government as well as to the road users. This seems to be the major reason while LIC spent proportionally less money on road safety than HIC. In addition, weak institutional structures and low motivation of staff entrusted with road safety contribute to a low effectiveness and efficiency of road safety measures in LIC.

The main categories of road safety expenditures that need to be financed are:

- Road safety engineering measures, including road signs and markings, which normally form part of the construction, rehabilitation, improvement, and maintenance of roads;
- Enforcement of laws and regulations related to road safety; and
- Road safety programmes, including road safety awareness campaigns, road safety education, emergency medical services, trauma centres for road accident victims, and road safety research.

In addition, the safety of road vehicles plays an important part in road safety as well. Road vehicle safety features, like brakes, lights, tyres, and seat belts, are an integral part of the cost of the vehicle that is born by the owner of the vehicle. Vehicle owners are paying for the road-worthiness testing as well.

Based on experiences in HIC, one can expect to spend between 10% and 15% of the cost of road construction, rehabilitation, improvement, and maintenance road safety engineering measures, more or less one quarter to one half of this amount on enforcement, and about 3–4% of the total expenditures on roads on road safety programmes.

The actual target of how much should be spent on road safety measures very much depends on the road safety situation in a specific country, the perceived importance of road safety improvements with relation to other spending

Table 3: Advantages and disadvantages of different sources of financing of road safety in LIC

Source of Funding	Advantages	Disadvantages
Surcharges on motor fuel	Low level of evasion Low collection fee	Difficulty to raise fuel prices
Surcharges on weight-distance charges	Accepted as user charge	High level of evasion
Surcharges on compulsory vehicle insurance fees	Best related to road safety	High level of evasion
Surcharges on vehicle licensing fees	Low collection fee	High level of evasion
Surcharges on road tolls	Low level of evasion Accepted as user charge	Toll roads form only a small part of the road network
Contribution by private sector	Can complement road safety financing and can make use of private sector management and efficiency	Can only provide limited amounts and may not be sustainable
Development loans and grants	Can initiate effective road safety programmes and financing schemes	Not sustainable

Box 8: Road safety expenditures in New Zealand as percentages of GDP

In the year 2001, New Zealand’s total road user accident costs were equivalent to about 4.4% of GDP or 13% of vehicle operating and ownership costs, while the portion of the road user charges spent on road safety, which includes road safety engineering measures and road safety programmes (see Figure 2) as well as enforcement of road safety regulations and fire and ambulance services, were equivalent to about 0.8% of GDP or 3% of vehicle operating and ownership costs (Ministry of Transport, New Zealand, 2005). Road safety programmes alone, including education, information, and promotion, accounted for about 0.06% of GDP.

priorities and the ways and means available to effectively and efficiently improve road safety. Although LIC are faced with much higher road accident rates than HIC they often do not perceive road safety as a high priority in relation to other more pressing issues. This is partly due

to lack of awareness of the actual cost of road accidents and to the poor institutional framework and low motivated staff dealing with road safety issues. Raising the awareness and improving the institutional issues is a process that takes time. Therefore, funds for road safety should only be raised gradually and in line with the improvement of the institutional and human resource issues that permit an effective and efficient spending of road safety funds.

A good measure of the effectiveness and efficiency of road safety measures is to calculate their benefit cost ratios and to execute only those measures that have high benefit cost ratios. In New Zealand, for example, road safety measures are executed by Transit New Zealand if they have a benefit cost ratio higher than 4. Australia conducted Black Spot Improvement Programmes in the 1990s with economic benefits of around US\$5 for each US\$ spent (Australian Transport Council 2006). In most LIC it might not be easy to calculate reliable benefit cost ratios due to a lack of data. In this case it is recommended to make use of experiences of

Box 9: 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 (TLR) maintains a database of local authority road safety schemes (the MOLASSES database). These are generally

low cost schemes, which address known problem locations. The table 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 24,400, with an overall average first year rate of return of 372% (GTZ 2002).

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

(Gorell and Tootill 2001)

other countries with similar conditions to fill the gap (see Box 9).

Road safety engineering measures, including road signs and markings, which normally form part of the construction, rehabilitation, improvement and maintenance of roads, are financed through government budgets or road funds. In LIC, the amounts spent on these measures are relatively low, even in those countries that have road funds, since they often struggle to get enough funds for road maintenance, which is considered to be of higher priority. Nevertheless, the funding situation is slowly improving giving more room for financing road safety engineering measures. Since most of the road funds do not mention road safety improvements as their obligation, it might help to assign road funds a more explicit role in financing road safety engineering measures. Countries that do not have



Table 4: Total annual amount of road safety fees collected if a surcharge of 1 US-cent per litre is being applied to each litre of fuel consumed on roads in selected LIC.

Country	Fuel consumption of road vehicles in million of litres			Road safety surcharges in million of US\$ per year
	Diesel	Gasoline	Total	
Bolivia	1,501	194	1,695	17
Brazil	41,623	12,948	54,571	545
Cameroon	481	108	589	59
Chad	126	9	135	1
China	68,767	15,819	84,586	846
Costa Rica	2,941	290	3,231	32
Egypt	5,582	1,627	7,209	72
Ethiopia	313	49	362	4
Ghana	289	74	363	4
India	21,207	14,937	36,144	361
Indonesia	15,123	5,873	20,996	210
Kazakhstan	2,549	813	3,362	34
Malaysia	11,006	5,628	16,634	17
Mexico	89,942	10,710	100,652	101
Namibia	778	63	841	8
Nicaragua	678	60	738	7
Nigeria	3,440	703	4,143	41
Pakistan	2,379	980	3,359	34
Rwanda	118	11	129	1
Sierra Leone	215	71	286	3
South Africa	22,915	3,185	26,100	261
Tanzania	281	21	302	3

Source: Fuel consumption (2002/2003), Metschies 2005

Fig. 10
The economic loss is plainly visible.

Photo: Bangladesh, Gunter Zietlow



Fig. 11
Exhausted truck drivers are a scourge to road safety.
Photo: Mauretania, Klaus Neumann

road funds, might try to create them to improve overall financing of road maintenance and road safety. The goal should be to spend about 15% of the budget for national and local roads for road safety engineering measures in the long run.

Besides the physical engineering measures to improve the safety aspects of roads and road vehicles, road safety programmes need to be financed such as road safety awareness campaigns, road safety education, and emergency medical services and trauma centres for road victims. Road safety programmes on a national, regional and local level can to be financed by a mix of road user charges and public and private sector funds. In LIC the target should be to spend the equivalent of between 3 and 5% of the total expenditures on roads for road safety programmes. In terms of cost per vehicle or cost per litre of fuel, this would roughly come to 0.9 and 1.4 US-Cent per litre of motor fuel or US\$14 to 30 per vehicle. On average, a

road safety surcharge on fuel of 1 US-Cent or US\$22 per vehicle should be enough to pay for road safety programmes.

In LIC with low vehicle density and high road accident rates, like India or Tanzania, these charges might have to be doubled or complemented by other means of financing through public funds or private sector contributions. The total annual amount of funds that can be obtained by applying a Road Safety Surcharge of 1 US-Cent on each litre of diesel and gasoline consumed on roads for selected countries can be viewed in Table 4. These amounts are very small in relation to the losses road users suffer from road accidents. For example, in Tanzania the total cost of road accidents was estimated at US\$156million in 1996, while the annual amount of the Road Safety Surcharges would come to US\$3 million or only about 2% of the total cost of road accidents per year.

For road safety campaigns to be effective a high degree of enforcement is necessary. Normally, enforcement of road safety related rules and regulations is being done by the national police and in some cases by a highway police that is part of the Ministry of Transport and/or Public Works as in Uruguay. In the case of New Zealand, the Land Transport Fund is contracting and paying the national police for its road safety related activities. In most LIC the national police force is underpaid and corruption is the norm rather than the exception. This makes the enforcement of rules and regulations almost impossible. To have a special road safety police to be in charge of road safety and paid and supervised by a Road Safety Fund might be a better solution.

5. Lessons learned

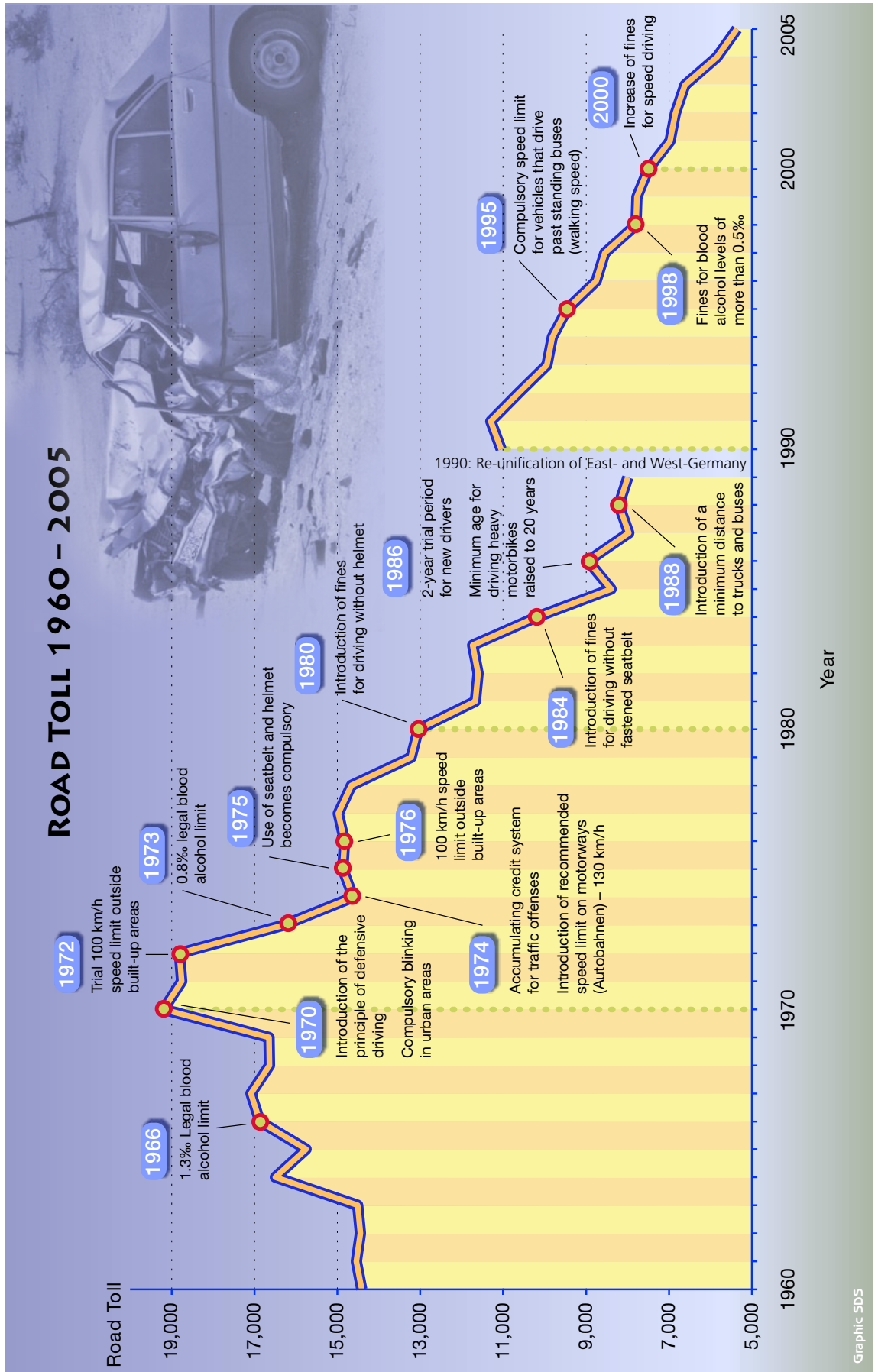
The tremendous importance of road safety to the economic development and especially to the road users who bear most of the road accident costs makes it necessary to pay special attention to improve road safety worldwide and especially in LIC who have substantially higher accident levels than High Income Countries (HIC). The efforts made in the past and that are being done today to improve the road safety situation in LIC, seem to be insufficient to reverse the trend. The situation is actually getting worst in many LIC, mainly due to increasing motorization in these countries.

The lessons learned so far are clear:

1. In order to improve long-term sustainability of road safety in LIC, three main problems need to be solved that are responsible for poor road safety records: (a) lack of awareness of the road safety problem in the public, the political and the professional arenas, (b) lack of institutional capacity and of adequately trained and motivated staff, and (c) insufficient funding of road safety measures.
2. All three problems need to be solved. But the funding problem seems to be the most difficult one to overcome and needs to be tackled first in combination with awareness campaigns. Without a stable and sufficient flow of funds for road safety, any attempt to solve institutional problems is bound to fail.
3. Road users and all other stakeholders need to be persuaded that only a fraction of the amounts presently being spent on road accidents can save a lot of money and pain for road users and the society, as long as systems are or can be put in place that effectively and efficiently improve road safety.
4. Road safety funds or road safety councils can be effective and efficient institutions as long as they have a sound legal basis, strong oversight by a private-public board, sound financial management, funding based on direct user charges, and regular technical and financial audits.
5. Financing can be secured through an existing and sufficiently funded road fund. If this is not an option, road safety charges could be raised either through an additional surcharge on motor fuels or vehicle insurance premiums, supplemented by contributions of the public and private sector.
6. As for the financing of road safety engineering measures, the same financing mechanism that is being used for funding road construction and maintenance should be applied. This would require approximately 10–15% of road construction, improvement, rehabilitation, and maintenance budgets.
7. Financing of other road safety programmes would need approximately US-Cent 1 per litre of motor fuel or 5–10% of vehicle insurance premiums. In LIC with low vehicle density and high road accident rates, like India or Tanzania, these charges might have to be doubled. Contributions of the public and private sector would not only help to increase funding but to involve other stakeholders in the use and control of road safety funds as well.
8. To enforce traffic rules and regulations, a special road safety police financed and supervised by a road safety fund might be more effective than the national police. This would need financing in addition to the funds required for the safety programmes mentioned above or shifting funds from the Ministry of Interior to the road safety fund, as it would reduce the amount of financing needed for the national police force.
9. International and bilateral donors can play an important role to initiate and assist LIC to make the necessary reforms of financing and managing road safety. Therefore, all road projects financed by the donor community should have a component to improve road safety, not only on the project level but on the road sector level as well.

Fig. 12
Total number of people killed in road accidents in Germany (1960–2003); Selected measures to improve traffic safety are highlighted.

Source: Sicherheit im Straßenverkehr 1950 – 2000 (Heinrich Praxenthaler; 2001; Kirschbaum Verlag)



References and resources

- Aeron-Thomas, A. 2002. *The Role of the Motor Insurance Industry in Preventing and Compensating Road Casualties*, Scoping Study—TRL, Crowthorn, UK prepared for DFID.
- Aeron-Thomas, A., A. J. Downing, G. D. Jacobs, J. P. Fletcher, T. Selby, and D. T. Silcock. 2002. *Review of road safety management practices – Final report*, TRL Limited with Ross Silcock, Babbie Group Ltd.
- Asian Development Bank. 2003. *Road Safety Guidelines for the Asian and Pacific Region*, Asian Development Bank, Manila, June 2003. See: <http://www.adb.org/Documents/Books/Road-Safety-Guidelines/default.asp>
- Asia-Pacific Economic Cooperation (APEC), <http://www.apec.org/>
- Australian Transport Council. 2006. *National Road Safety Action Plan 2007 and 2008*, Australian Transport Council, Australian Government. http://www.atcouncil.gov.au/documents/nrss_actionplan_0708.pdf
- Deutscher Verkehrssicherheitsrat (DVR). <http://www.dvr.de>
- European Transport Safety Council (ETSC). <http://www.etsc.be>
- Federal Highway Administration (FHWA), <http://www.fhwa.dot.gov>
- Froning, P. 1992. *Potential Revenue Sources for Virginia's Transport Safety Programs: Review of Virginia's Revenue Sources and a Survey of Other States—Final Report*, Charlottesville, VA.
- Gorell, R. S. J. and W. Tootill. 2001. *Monitoring Local Authority road safety schemes using MOLASSES*, TRL report TRL512, TRL, Crowthorne, UK.
- Global Road Safety Partnership (GRSP), <http://www.GRSProadsafety.org>
- Global Road Safety Partnership. 2005. *Road Safety Management—Information Note 3: Funding*, Global Road Safety Partnership (GRSP), <http://www.grsroadsafety.org/themes/default/pdfs/Information%20note%203.pdf>
- Global Road Safety Partnership. 2006. *Knowledge Base*, <http://www.grsroadsafety.org/?pageid=10>
- GTZ. 2002. *Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities, Module 5b, Urban Road Safety*, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH. <http://www.sutp.org>
- Heggie, I. G. and P. Vickers. 1998. *Commercial Management and Financing of Roads*, World Bank Technical Paper No. 409, The World Bank, Washington, D. C., <http://rru.worldbank.org/Documents/Toolkits/Highways/pdf/17.pdf>
- International Road Federation. 1999. *World Road Statistics 1999*, IRF Geneva. <http://www.irfnet.org>
- Jacobs, G., A. Aeron-Thomas, and A. Astrop. 2000. *Estimating global road fatalities*, TLR Report 445, Transport Research Laboratory, http://www.transport-links.org/transport_links/filearea/publications/1_329_TRL445.pdf
- Land Transport Safety Authority 2004. *Annual Report 2004*, Ministry of Transport, New Zealand, <http://www.landtransport.govt.nz/ltsa/about/docs/annual-report-03-04.pdf>
- Land Transport New Zealand, <http://www.landtransport.govt.nz>
- Metschies, G. P. 2005. *International Fuel Prices 2005, 4th Edition*, GTZ Eschborn. <http://zietlow.com/docs/FuelPrices2005.pdf>
- Ministry of Transport—New Zealand. 2005. *Surface Transport Costs and Charges: Summary of main findings and issues*, Ministry of Transport of New Zealand, <http://www.transport.govt.nz/assets/PDFs/surface-transport-overview.pdf>
- National Highway Transport Safety Administration (NHTSA), <http://www.nhtsa.dot.gov>
- Road Safety Trust. 2005. *Sixteenth Annual Report of the Road Safety Trust for the year ended 30 June 2005*, Road Safety Trust, New Zealand. http://www.parliament.govt.nz/NR/rdonlyres/736E753B-E014-4F4B-96CA-2AA04FCC8103/42798/DBHOH_PAP_14376_3762.pdf

- Sabey, B. and H. Taylor. 1980. *The known risk we run: the highway*, TRRL Supplementary Report SR 576, TRL Ltd., Crowthorne.
- Safety Administration Programme. 2005. *Safety Administration Programme 2005/06*, Land Transport New Zealand, <http://www.itsa.govt.nz/funding/sap/2005/index.html>
- Transport Legislation Bill. 2004. Government of New Zealand.
- United Nations. 2005. *The global road safety crisis: progress on the implementation of General Assembly resolution 58/289*, Report of the General Secretary, http://www.fiafoundation.com/resources/documents/2006694708__un_sg_final_report_1st_august_2005.pdf
- World Bank. 1998. *Road Safety in Africa—Appraisal of Road Safety Initiatives In Five African Countries*, SSATP Working Paper No. 33, The World Bank, <http://www4.worldbank.org/afr/ssatp/Resources/SSATP-WorkingPapers/SSATPWP33.pdf>
- World Bank. 2006. *Sub-Saharan Africa—Transport Policy Program*, The World Bank Group, External Website. World Road Association (PIARC), <http://www.piarc.inrets.fr>
- World Bank. *The Role, Function and Responsibilities of National Road Safety Council (NRSC) and the NRSC Secretariat*, http://www.worldbank.org/transport/roads/saf_docs/nrsc.pdf
- World Bank. Road Safety Website: <http://www.worldbank.org/transport/roads/safety.htm>
- Zietlow, G. 2005. *Road funds: sustainable financing and management of Latin America's Roads*, Transport and Communications Bulletin for Asia and the Pacific No. 75, Road Maintenance Funds, United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), New York 2005, http://www.unescap.org/ttdw/Publications/TPTS_pubs/bulletin75/Bulletin75_fulltext.pdf



Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH

Dag-Hammarskjöld-Weg 1-5
P. O. Box 5180
65726 ESCHBORN / GERMANY
Phone +49-6196-79-1357
Telefax +49-6196-79-7194
Internet <http://www.gtz.de>

