Standing Committee
for Economic and Commercial Cooperation
of the Organization of Islamic Cooperation (COMCEC)

COMCEC

Improving Road Safety in the OIC Member States

COMCEC COORDINATION OFFICE
October 2016

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Abbreviations

AARSI	Arrive Alive Road Safety initiative
ABS	Anti-lock Braking System
ARC	Accident Research Centre
ARI	Accident Research Institute
ASAC	Association of Insurance Companies of Cameroon
BAAC	Accident Analysis Module
BCR	Office of Road Traffic
BNFE	Bureau of non-Formal Education
BRAC	Bangladesh Rural Advancement Committee
BRTA	Bangladesh Road Transport Authority
BUET	Bangladesh University of Engineering and Technology
CISR	Inter-Ministerial Committee on Road Safety
CMVSS	Canada Motor Vehicle Safety Standards
CNEH	National Testing and Approval Centre
CNER	National centre for studies and highway investigations
CNPAC	Comité National de Prevention des Accidents de la Circulation
COMCEC	Committee for Economic and Commercial Cooperation of the Organisation of Islamic Cooperation
CPSR	Permanent Committee of Road Safety
CRSR	Regional Committee of Road Safety
DoA	Decade of Action
DR	Le Ministère de L'Equipement, du Transport et de la Logistique - la Direction des Routes /Roads and Road Traffic Department (Morocco)
DRSCs	District Road Safety Committees
DSI	Direction de Système d'Information
DTRSR	Le Ministère de L'Equipement, du Transport et de la Logistique - La Direction des Transport Routiers et de la Securité Routière
ESC	Electronic Stability Control
EUCARIS	European Car and driving license Information System
FMVSS	American Federal Motor Vehicle Safety Standards
FNI	Fichier National d'Immatriculation
FRSC	Federal Road Safety Corps
FRSCCU	Federal Road Safety Corps Command Units
HF	Human Factors
HIC	High Income Countries
INTPC	Indonesian National Traffic Police Corps
IRSMS	Accident Information System
IRTAD	International Traffic Safety Data and Analysis Group
ISO	International Organisation for Standardisation
LGED	Local Government Engineering Department
LIC	Low Income Countries

METL	Ministry of Equipment and Transport and Logistics
MIC	Middle Income Countries
MINT	Ministry of Transport
MINTP	Ministry of Public Works
MOH	Ministry of Health
MOHA	Ministry of Home Affairs
MOI	Ministry of Information
NGO	Non-governmental organisation
NLTP	National Land Transport Policy
NMV	Non-Motorised Vehicles
NPSO	National Observatory of Public Health
NRSC	National Road Safety Council
NRSS	Nigeria Road Safety Strategy
NSM	Network Safety Management
OIC	Organisation of Islamic Cooperation
OSAC	Overseas Security Advisory Council
pcGNI	Per capita Gross National Income
POV	Point of View
PSIU	Integrated Strategic Plans
PT	Vehicle Standards
PTI	Periodic technical inspections
RDW	Vehicle Technology and Information Centre (Dutch Vehicle and Driving Licence Registration Authority)
RHD	Roads and Highways Department
RRSM	Rural Road Safety Manual
RSA	Road Safety Authority
RSAPs	Road Safety Strategic Action Plans
RSC	Road Safety Cell
RSI	Road Safety Inspection
RSIA	Road Safety Impact Assessment
RSMS	Road Safety Management System
RSTM	Road Safety Training Manual
RTHD	Road Transport and Highway Division
RTM	Road Traffic Management
RTS	Road Traffic Safety
SARP	Strategic Accident Reduction Programme
SDPSR	Sub-Department of Prevention and Road Safety
SER	Self-Explaining Roads
SPIs	Intermediate Safety Outcome Factors
SWOV	Institute for Road Safety Research
WBB	Work for Better Bangladesh

Executive Summary

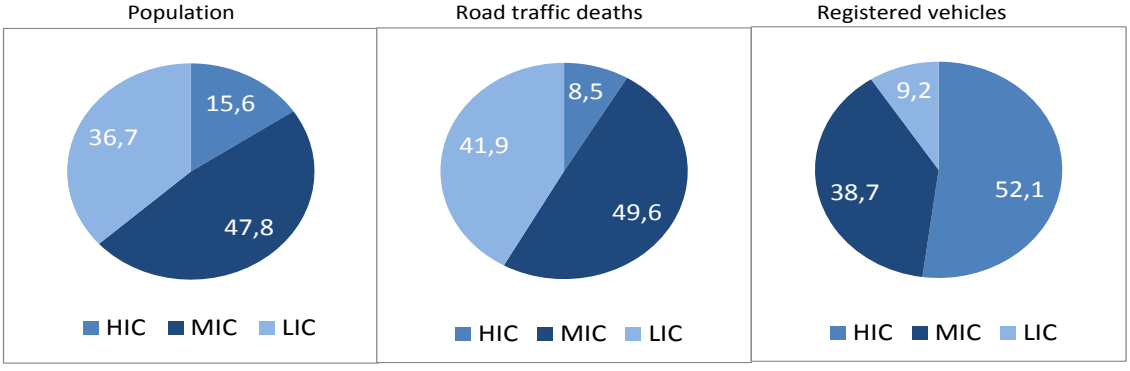
Rationale for focusing on road safety

Transportation is one of the six cooperation areas of COMCEC. The ambition is to help OIC member countries to overcome transportation related problems in order to facilitate improved movement of goods and passengers. As part of this endeavour, COMCEC has embraced the goals of the United Nations (UN Resolution for the Decade of Action for Road Safety 2011-2020). The "Decade of Action Resolution" calls for signatories to implement far-reaching road safety programmes aimed at ultimately halving death and serious injuries in traffic related accidents by 2020.

The World Health Organisation (WHO) estimates that more than 1.2 million people die on the world's roads annually. The majority of these deaths occur on the roads of middle and low income countries and cost these countries approximately 3% of GDP annually. Traffic accidents are preventable, yet they are still one of leading causes of mortality in todays' society.

The WHO reveals that the annual number of fatalities worldwide seems to have stabilised. However, this is primarily attributable to significant improvements in road safety management in high income countries. Trends in middle and low income countries show a different picture in which traffic mortality rates are disproportionately high. Low income countries have the highest traffic mortality rate (24.1 deaths/100,000 inhabitants); almost three times that of high income countries (9.2 deaths/100,000 inhabitants).

This is reflected in the figure below, which indicates that over 90% of road traffic deaths occur in low and middle income countries, which have only 48% of the world's registered vehicles. Expected growth in car ownership and motorisation in low and middle income countries in the coming decades will continue to put pressure on road safety in the low and middle income countries.



Source: WHO, Decade of Action for road safety, 2011-2020

Decade of Action

As mentioned above, the UN launched its Decade of Action for Road Safety in over 100 countries in 2011. The ultimate aim of the programme was to prevent five million road traffic deaths by 2020. The activities in the Decade of Action are built on five pillars:

1. Road Safety Management;
2. Safer Roads and Mobility;
3. Safer Vehicles;
4. Safer Road Users;
5. Post-crash Response.

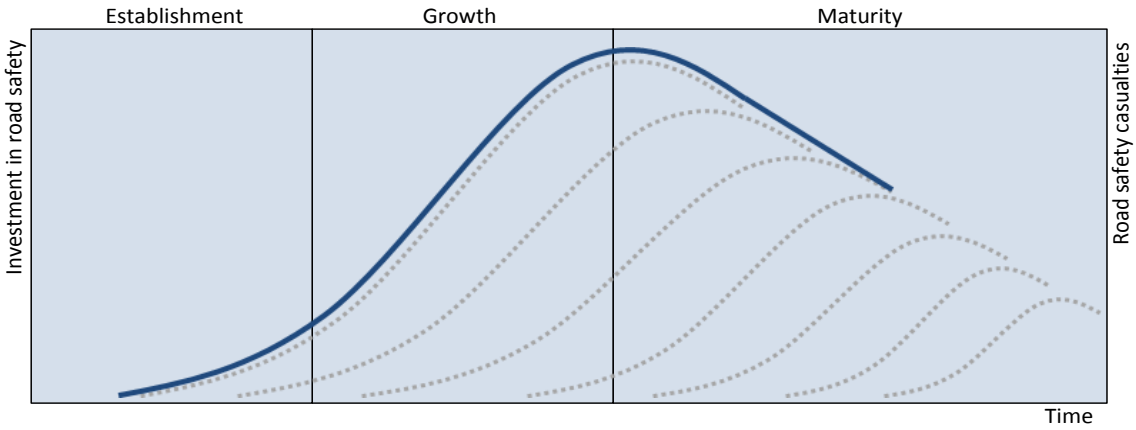
Three of these pillars are traditional elements of the road traffic system (roads, vehicles, users) and are usually treated separately, often applying the 3 E's: education, enforcement and engineering. The UN resolution encourages countries to implement integrated road safety strategies targeting all five pillars. These strategies should be developed taking into account country specific requirements, resources and capabilities. The five pillars are used in this project to streamline our analysis of and recommendations for the OIC member countries. In this process we have added a specific element, i.e. road safety data.

Safe Systems Approach

In two of the safest countries in the world, Sweden and the Netherlands, it was realized that all of the elements, as included in the five pillars, have to work together as a system. The Swedish Vision Zero and Dutch Sustainable Safety were the inspiration for the internationally accepted Safe Systems Approach. In the OECD report "Towards Zero" it is explained how this approach puts the road user as a central element in the system: roads, vehicles, legislation, etc. have to be tuned to the strengths and weaknesses of the road user. There is no Safe Systems blueprint; hence it is called the Safe Systems Approach. The approach is universally applicable, however putting Safe Systems thinking into practice requires local knowledge and consideration. Hence the importance of this study, in which the background of the Safe Systems Approach is presented and a benchmarking study of road safety management in the OIC member countries is conducted as a basis for developing strategic directions and providing policy recommendations.

Road safety development phases

A clear relationship can be established between road safety initiatives and policies on the one hand and the longer term effects on road safety on the other hand. In this relationship three road safety development phases can be identified, i.e. establishment, growth and maturity. The curve indicates an increasing road safety problem, with a growing number of road safety casualties, due to rapid motorisation, and an eventual reverse of the curve as a result of road safety policy and measures.



Source: Ecorys and SWOV

Typical road safety characteristics for the five road safety pillars, as well as road safety data, can be linked to the road safety development phases, as presented in the table below.

Development Phases	Establishment	Growth	Consolidation
Road safety management	• No/limited political will • Limited interaction between stakeholders • Lack of coordination, no integrated approach • Limited funding • Weak legal framework • Limited supporting research • No local research	• Road safety growing concern with political support. • Limited funding • Treatment segregated • Limited coordination • Limited local research • Limited monitoring evaluation • Fair legislative framework	• Well-developed political support • Fair to high degree of integrated coordination • Fair to adequate funding • Supporting legislative regulatory framework • Intergraded action programme • Targeted research
Safer roads and mobility	• Underdeveloped road network • Limited sized network • Poor road conditions • Lack of road standards • Limited capacity in road management • Limited attention for vulnerable road users	• Developing road network • Varying design standards • Fair road maintenance • Limited attention for vulnerable road users • Developing public transportation facilities	• Developed road network • Good public transport facilities • Integrated planning and development • Multimodal systems • Good quality facilities
Safer vehicles	• Low car ownership and low vehicle mileage • Limited vehicle standards	• Growing car ownership • High age of vehicles • Developing public transportation	• Stabilised car ownership • Low age of vehicles • International vehicle standards applied

Development Phases	Establishment	Growth	Consolidation
	• High age of vehicles • Limited roadworthy tests • Weak public transportation		• Standard requirements for new and existing vehicles • Good public transportation
Safer road users	• Low quality drivers • Limited road safety awareness (speeding, helmets, alcohol, seat belts, child restraints) • Limited effective road safety education • Ad hoc enforcement aimed at income generation vs safety	• Growing number of drivers • Low seatbelt rate • Low adherence of traffic laws • Improving critical offence rates • Increased enforcement • Ad hoc education and promotional campaigns	• Good quality drivers • Low infringement rate • Penalty point driver licensing • High and visible enforcement • High compliance rates to critical offences • High awareness of road safety • Well established training and educational programs • Strict control for licensing
Post-crash response	• Limited number of ambulances • Limited trauma centres • No protocols on road crashes	• Ambulances and trauma centres in major urban areas • Reasonable levels of training • Protocols available	• Adequate number of trauma centres and personnel • High quality protocols • Performance monitoring and evaluation of targets
Road safety data	• Low quality crash data • No crash management system • Poor registration and reporting • Inadequate system protocols • Poor control checks and balances • Limited exposure data • Poor location data	• Poor to reasonable quality crash data • Limited controls and verification • Locations generally known • Limited critical offence and enforcement data	• Moderate to high quality crash data • Exposure data widely available • Location specific • Enforcement data available • Critical offences data available

Source: Ecorys and SWOV

Road safety performance in OIC member countries

A comparison has been made of road safety performance, measured in mortality rate (number of road traffic deaths per population size), in OIC member countries and non-OIC member countries. Mortality rates are then linked to economic development of the OIC member countries, measured in income per capita, resulting in the classification of high income country (HIC), middle income country (MIC) and low income country (LIC).

The OIC member countries show diversity in road safety performance, with mortality rates ranging from 8.3 (Bahrein) to 32.1 (Iran) per 100,000 inhabitants. Regional differences exist, with mortality rate averages of the OIC member countries in the African group of 24.5; the Arab group of 21.2 and the Asian group of 16.1 Mortality rates in the OIC member countries are in general higher than expected, based on comparison with other countries of similar income levels). As an indication, the world average mortality rate 18.8 and the global average for MICs and LICS is 19.5 and 21.5 respectively.

As for road safety performance, the OIC member countries can be stratified into four groups:

1. HICs with much higher road mortality than average for HICs in general;
2. MICs with higher than average road mortality;
3. MICs with lower than average road mortality;
4. LICs with mortality that is high in an absolute sense.

Road safety management in OIC member countries

Literature review indicates that OIC member countries generally are in the early development stages of the Safe Systems Approach, as advocated by the Global Plan for the Decade of Action. A number of countries in the Arab and Asian region have taken steps to improve road safety management to the extent that they are now comparable to many other international countries, which have adopted and practiced the Safe Systems Approach. However, these countries have not as yet developed an integrated approach across all pillars (including roads and mobility; vehicles; road users and post-crash care) sufficiently to be considered as practising the fundamentals of a Safe Systems Approach.

Countries worth mentioning as seemingly to have advanced most in the direction of a Safe Systems Approach are the United Arab Emirates and Kazakhstan and to a lesser extent Oman, Turkey and Malaysia.

Recommended starting point: know where you stand

A country faces road safety challenges based on the specific road safety development phase which the country is in. Typical policy measures are proposed that are effective in the defined road safety development phases. Therefore, it is important to know where a country stands in terms of its road safety development in order to determine the appropriate course of action.

Specific tools have been designed to assist countries in conducting road safety capacity reviews and prepare follow-up road safety projects. For example, the World Bank has developed the Road Safety Management Capacity Reviews and Safe System Projects Guidelines. It is highly

recommended to invest in a road safety capacity review, either using the above-mentioned guidelines or other approaches. Although the procedures are extensive and generally time consuming, this should not be seen as a barrier to implementing a comprehensive review, as the benefits are substantial. The more specific the assessment is made, the better actions towards improving road safety can be tailored.

General recommendations: no regret actions

Most OIC member countries are in the establishment and growth phase. The current investment into road safety is considered low by most standards and decision makers and politicians must realise that *substantial investment* will be required in future if the country wants to reduce the current economic burden of road crashes on the economy.

For all OIC member countries general road safety improvement measures can be found in the following directions.

- Applying a *Safe Systems Approach* by developing a road transport system that accounts for human error and the vulnerability of the human body and considering all the road safety aspects, as reflected in the five road safety pillars, in an integrated way.
- *A cohesive approach with clear tasks and responsibilities*. Knowing the multi-disciplinary character of road safety and the large number of stakeholders involved, it is important to develop a cohesive approach, which can be reinforced by appointing a lead agency.
- *Raising awareness for road safety*. This is relevant throughout society, from politicians, having to place road safety on the political agenda, through to children, who need to be educated on road safety.
- *Knowledge transfer and capacity building*, leading to a knowledge base that is shared between the various stakeholders involved in road safety.
- *Sound understanding of road safety* is crucial, and is reflected in research in the following areas:
  - Analysis of crash types and crash factors, as a basis for defining effective measures.
  - Further analysis related to motorisation level and travel behaviour, as a basis for understanding the context of road safety.

Specific groups of OIC member countries may benefit from the following approach.

- HICs might be able to deal with their problems when supplied with sufficient adequate knowledge, regarding their specific road safety situation and adequate best practices.
- The higher than average MIC group might gain from a specific approach where road and transport infrastructure is improved, focussing on specific safety problems, notably regarding pedestrians.
- Countries that still have to go through a motorisation growth should focus on a policy regarding vehicles (affordable and not too fast cars rather than powered two wheelers) and to improve infrastructure in time. Paired with that is setting vehicle and driver standards and ensuring that the enforcement and controls of these standards are put in place.

- LICs could benefit from focus on simple infrastructural measures, e.g. by improving pedestrian safety.

Specific recommendations: linked to road safety development phase

Each OIC member country can position itself in one of the road safety development phases. The identified road safety development phase helps to define relevant policy measures. It should be mentioned that countries can be in different phases per road safety pillar. In this case it is recommended to focus on the policy measures that are linked to the relevant development phase.

Below, policy measures are presented for OIC member countries in the establishment and the growth phase, as this applies to most OIC member countries. The next table identifies policy measures per road safety pillar (as well as road safety data) for the OIC member countries that are in the *establishment phase*.

Policy measures for OIC member countries in the establishment phase

Road Safety Pillar	Measures
Road safety management	• Garner political support for road safety • Improvement of poor to medium quality road safety information systems • Development of co-ordination structures • Assigning lead agency responsible for road safety management • Development of coordination structures • Development of policy review procedures • Setting of short term targets and long term initiatives • Develop and maintain specific delivery partnerships between government, NGO, community and business at the central, regional and local levels
Safer roads and mobility	• Develop road network categorisation plans • Develop appropriate functional and operational characteristics for road types • Setting of appropriate speed limits • Encourages public transportation use • Develops strategies and plans for vulnerable road users • Secures funding for development projects
Safer vehicles	• Establish vehicle registration registers • Develop minimum standards for entry of vehicles on public roads • Develop roadworthiness criteria and monitoring systems • Develop enforcement strategies • Set standards and regulations regarding the use of vehicles

Road Safety Pillar	Measures
Safer road users	• Set the safety standards and rules and continuing compliance requirements that will ensure the safety of the individual concerned but also that of fellow road users • Develop standards for driver licensing, testing and appraisal • Driver offences monitoring • Develop and implement educational programmes for school children • Develop strategies to improve safety of vulnerable road users
Post-crash response	• Review the capabilities and capacity of trauma response units • Establish key performance data and set targets • Develop monitoring systems • Implement regional pilot projects • Develop strategies to improve capacity and resource allocation for trauma response and management
Road safety data	• Establish central computerised transport and driver licensing registries to manage data on the number of vehicles and drivers on the road which are easily accessible for enforcement agencies • Establish a reliable crash reporting and recording system • Develop programmes to obtain supplementary data for road safety management (traffic volumes; speeds; etc.)

Source: SWOV

For the OIC member countries that are in the *growth phase* recommended actions are presented in the next table.

Policy measures for OIC member countries in the growth phase

Road Safety Pillar	Measures
Road safety management	• Foster relationships to maintain political support for road safety • Development of medium to high quality management information system • Coordination central levels • Adopting short to medium term road safety targets • Analysing what can be achieve in the medium term • Develop and maintain specific delivery partnerships between government, NGO, community and business at the central, regional and local levels
Safer roads and mobility	• Implements large scale remedial road improvement projects • Implements strategic road network development plans • Implements large scale improvement projects for vulnerable road users • Adopts an integrated approach to road infrastructure planning and provision • Adopts a Safe Systems Approach to road design

Road Safety Pillar	Measures
Safer vehicles	• Maintain and improve vehicle registration and licensing • Vehicle roadworthiness • Vehicle standards • Traffic offence monitoring of roadworthiness • Public transportation vehicle standards • Commercial vehicle standards
Safer road users	• Review and set the safety standards and rules for continuing road user compliance • Driver licensing and testing • Offences monitoring • Targeted law enforcement and critical driver offences monitor • Informed educational and publicity campaigns for improved road user behaviours • Securing legislative resources for road safety
Post-crash response	• Emergency response goals and monitoring • Fleet assessment • Quality reviews emergency and trauma care • Protocols and standards • Funding for emergency and trauma care
Road safety data	• Evaluate and improve crash registrations • Develop supportive Safety Performance Indicators (SPIs) • Establish central computerised transport and driver licensing registries to manage data on the number of vehicles and drivers on the road which are easily accessible for enforcement agencies • Establish linkages between national causes of death statistics to assess and validate traffic fatalities • Establish or adopt tools for local highway and police authorities to undertake data collection, analysis and monitoring techniques and database management • Report road safety results and progress made and make interactive crash data systems available on the Internet

Source: SWOV

Section 1: FRAMEWORK FOR ROAD SAFETY

1 Introduction

The aim of the study is to improve road safety management capacity in OIC member countries in order to reduce road accidents.

1.1 Background

Focus on road safety

Transportation is one of the six cooperation areas of COMCEC. In this specific area COMCEC is striving to assist member states in overcoming transportation-related problems in order to facilitate improved movement of goods and passengers between the member states. As part of this endeavour, COMCEC has embraced the goals of United Nations' (UN) Resolution for the Decade of Action (DoA) for Road Safety 2011-2020 (United Nations, 2011). The DoA calls for signatories to implement far-reaching road safety programmes aimed at ultimately halving fatalities and serious injuries in traffic-related accidents by 2020. The UN General Assembly has since adopted two specific road safety related goals as part of its 2030 Agenda for Sustainable Development. These aim at halving road deaths and serious injuries by 2020 (Sustainable Development Goal 3) and by 2030, providing access to safe, affordable, accessible and sustainable transport systems for all (Sustainable Development Goal 11). The second road safety related goal targets improved public transport and calls for special attention to the needs of vulnerable people, women, children, the disabled and elderly persons.

The World Health Organisation (WHO) estimates that more than 1.2 million people die on the world's roads annually (World Health Organisation, 2015). The majority of these deaths occur on the roads of middle and low income countries and cost these countries approximately 3% of GDP annually. Traffic accidents are preventable however they are still amongst the leading causes of mortality in todays' society.

The WHO report reveals that although the annual number of fatalities worldwide seems to have stabilised that this is primarily attributable to significant improvements in road safety management in high income countries. Trends in middle and low income countries do not reflect this and given the differences in the levels of motorisation, traffic mortality rates are disproportionately high in these countries. The WHO report reveals that high income countries account for 18% of the world population, 46% of the registered motor vehicle population and 10% of all road traffic deaths. Low income countries account for 12% of the world population, 1% of registered vehicles and 16% of road deaths. Medium income countries make up the balance (70% population; 53% vehicles and 74% traffic fatalities). Low income countries have the highest traffic related mortality rate (24.1 deaths/100,000 inhabitants); almost three times that of high income countries (9.2 deaths/ 100,000 inhabitants). As mentioned earlier, the number of traffic related deaths in high income countries has been declining over the period 2010-2013, whereas in low and middle income countries it has been increasing.

Projections of the predicted development of traffic fatalities in the various world regions showed that over the period 2000 to 2020, a global increase of 66% was anticipated (Kopits & Cropper, 2003), with all the regions showing increases, although high income countries, as a separate group, were anticipated to show significant decline in the number of traffic fatalities, as indicated in Table 1[1].

Table 1: Predicted road traffic fatalities in low and medium income countries

Middle and Low Income Countries by World Bank Region	No. of Countries	Estimated Number of Fatalities (x 1000) by year		Percentage Change 2000-20	Fatality Rates (death/100,000 population)	
		2000	2020	%	2000	2020
South Asia	7	135	330	143.9	10.2	18.9
East Asia and Pacific	15	188	337	79.8	10.9	16.8
Middle East and North Africa	13	56	94	67.5	19.2	22.3
Latin America and Caribbean	31	122	180	48.1	26.1	31.0
Europe and Central Asia	9	32	38	18.2	19.0	21.2
All Middle and Low income countries	121	613	1,124	83.3	13.3	19.0
All High income countries	35	110	80	-27.8	11.8	7.8
Global Average	156	723	1,204	66.4	13.0	17.4

Source: Kopits & Cropper, Table 8

The Decade of Action

Given the impact of traffic related deaths in especially low and middle income countries, the United Nations launched its Decade of Action for Road Safety in over 100 countries in 2011. The ultimate aim of the programme was to prevent five million road traffic deaths by 2020.

The activities in the Decade of Action are built on five pillars:

1. Road Safety Management;
2. Safer Roads and Mobility;
3. Safer Vehicles;
4. Safer Road Users;
5. Post-crash Response.

[1] Figures are adjusted for under reporting.

Three of these pillars are traditional elements of the road traffic system (roads, vehicles, users) and are usually treated separately, often applying the 3 E's: education, enforcement and engineering. However, in two of the safest countries in the world, Sweden and the Netherlands, it was realised that all of these elements (have to) work together as a system. The Swedish Vision Zero (Tingvall & Haworth, 1999) and Dutch Sustainable Safety (Koomstra et al., 1992; Wegman & Aarts, 2006) were the inspiration for the internationally accepted Safe Systems Approach.

In the OECD report "Towards Zero" (OECD, 2008) it is explained how this approach places the road user as a central element in the system: roads, vehicles, legislation, etc. have to be tuned to the strengths and weaknesses of the road user. Some of the human limitations are biophysical, which implies that vulnerable road users such as pedestrians and cyclists should be separated from motorised traffic. This idea brings about concepts such as the categorisation of the road network, safe (i.e. low and credible) speeds where motorised and non-motorised road users meet, airbags, ESC etc. Other limitations are of a more cognitive or psychological nature: everybody makes mistakes; (too) many take risks occasionally or frequently. Preferably the road design and safety culture will help prevent crashes (i.e. via self-explaining roads, designated drivers, etc.) but in the end enforcement will be an inevitable road safety measure that has to be integrated in the system.

Safe Systems Approach

It is evident from the above that there is no Safe Systems blueprint, hence it is called the Safe Systems Approach. The underlying theory (i.e. the approach) is universally applicable but putting Safe Systems thinking into practice requires local knowledge and consideration. In the so-called SUNflower evaluation (Koomstra et al., 2002), countries with a comparable road safety record were compared and benchmarked. This study compared **S**weden, the **U**K and the **N**etherlands (hence **SUN**). These countries were considered similar since all three were among the safest traffic countries in the world, part of Europe and belonged to the high income group of countries. However, the study revealed that not only were the problems different but also the solutions. For example, the Netherlands is densely populated and has many cyclists, unlike Sweden and the UK. What they did have in common was the evidence-based approach. A general conclusion is that countries can learn from one another's experiences but these cannot always be copied and reproduced. Following the initial SUNflower study, an expanded benchmarking study was conducted (Morsink et al., 2005). Also IRTAD is benchmarking ten Latin American countries using the SUNflower-approach. All these studies compare the performances of different countries and in this regard, attempt to identify stronger and weaker areas in road safety management.

The UN Declaration encourages countries to implement integrated road safety strategies targeting all five pillars. These strategies should be developed taking into account country specific requirements, resources and capabilities.

Since COMCEC has identified road safety as an important part of its cooperation agenda, it wishes to conduct a benchmarking study of road safety management in its member countries in order develop some strategic direction and provide future policy recommendations.

1.2 Objective of the Project

The main objective of this project is to assist OIC member countries with the reduction of road accidents. To this end, the study focuses on international best practices and the development of a framework for road safety that can be applied in OIC member countries. At the same time, it reviews road safety in OIC member countries, through desk research, questionnaire and surveys, as well as a number of country-specific case studies. The combination of this research has led to conclusions and recommendations on how to improve road safety in OIC member countries.

The results of the project will contribute to the process of raising awareness of road safety among the OIC member countries, as well as to trigger a debate on specifically how to improve road safety, based on the findings of the study.

1.3 Contents of This Report

Four sections can be distinguished in this report:

1. **Road safety: status, trends and conceptual framework**
   Besides this introduction (Chapter 1), Section 1 also addresses the methodological approach (Chapter 2); international trends and best practices in Road Safety Management (Chapter 3); the importance of a Road Safety Lead Agency (Chapter 4); and Road Safety Development phases (Chapter 5).

2. **Road safety in OIC member countries**
   This section deals with road safety performance in OIC member countries (Chapter 6);and the five road safety pillars in OIC member countries, based on desk research (Chapter 7) and the survey (Chapter 8).

3. **Case studies**
   This section describes the results of three cases studies, i.e. Bangladesh (Chapter 9), Cameroon (Chapter 10) and Morocco (Chapter 11).

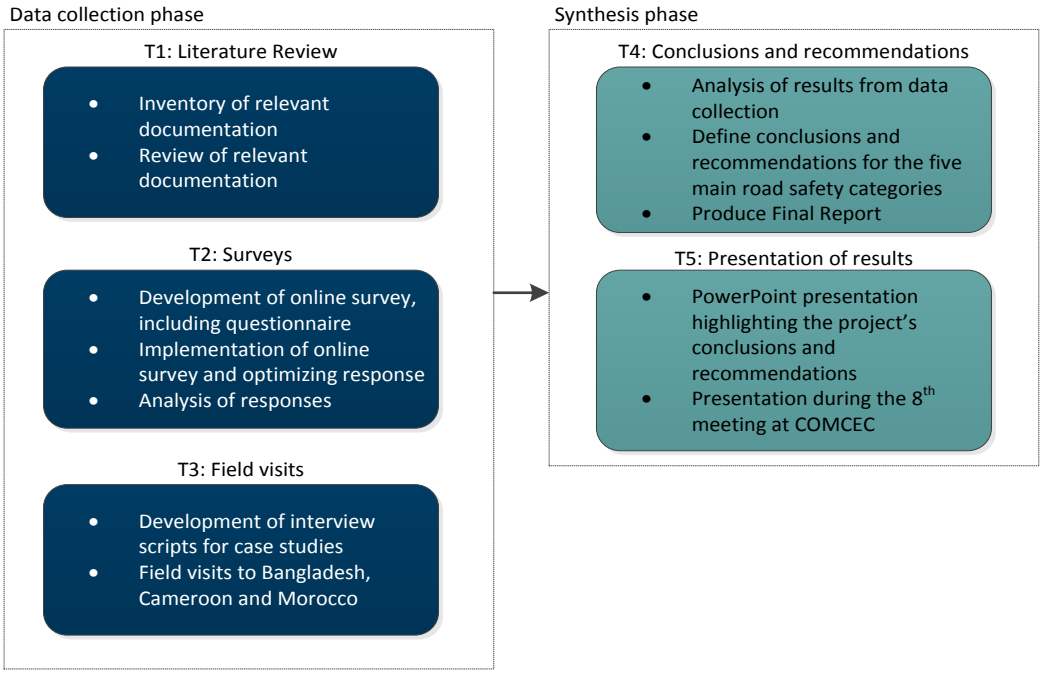
4. **Conclusions and recommendations**
   The section concludes the report by presenting conclusions and recommendations (Chapter 12).

2 Methodological Approach

2.1 General Approach

The methodological approach for the study is built on two distinct phases, i.e. the data collection and the synthesis phase, as presented in Figure 1. The data collection phase consists of literature review, surveys and field visits and the synthesis phase consists of drafting conclusions and recommendations and the presentation of results.

Figure 1: Methodological approach



Source: Ecorys

2.2 Literature Review

The literature review provides the ingredients for developing a framework for road safety, based on international best practices, and a review of road safety performance of OIC member countries compared to other countries. The review makes use of published reports and documentation. Literature review entails a number of tasks, namely:

- A summary of international best practice regarding road safety management.
- Comparing road safety performance data of OIC member countries with the rest of the world using reported fatality data, mortality rates and other data revealing the outcomes of road safety efforts in those countries.
- An overview of the status of road safety in OIC member countries using the five road safety pillars, as encouraged by the United Nations as a reference framework.

For the first task a focussed literature review was carried out. The review concentrated on known state of the art publications on road safety management, specifically those with a focus on road safety capacity reviews. In addition, a number of websites providing relevant information on factsheets, reviews and checklists were consulted to supplement the literature. This is presented in Chapters 3 and 4 of the report.

For the state of road safety in OIC member countries, the following sources were primarily used:

- Statistics published by the World Health Organisation. This provides an overview of road safety in most countries (World Health Organisation, 2015) but also gives access to the underlying data for each of the countries. The database covers 53 of the 57 OIC member countries and allows for various analyses to be performed with which to compare OIC countries with one another and with other non-OIC countries.
- Data published by the International Road Federation, specifically their report World Road Statistics 2015, covering the period 2008-2013, have been accessed. Section 6 of the IRF report deals with road accidents and various relevant statistics.
- The International Traffic Safety Data and Analysis Group (IRTAD) of OECD covers a limited selection of OIC members: Nigeria, Malaysia and Morocco.

The above sources were complemented by a web search of reports and documents providing relevant road safety information in each of the 57 OIC member countries. The search was aimed at sourcing country specific reports describing the status quo of road safety in terms of the five pillars of the Decade of Action (road safety management; safer roads and mobility; safer vehicles; safer road users and post-crash response) in each of the OIC member countries. Results are presented in Chapters 6 and 7.

2.3 Surveys

Two surveys have been carried out; a first initial survey and a second more extensive survey. As such, a two-stage approach has been applied whereby an initial screening survey was sent to all OIC member countries, targeting the COMCEC focal points of the OIC member countries. The feedback from the screening survey facilitated the identification and selection of a core group of OIC member countries for the detailed survey which has a more topical focus, concentrating on policy aspects and following the five road safety pillars. The results are presented in Chapter 8.

2.4 Case Studies

Three case studies have been carried out in Bangladesh, Cameroon and Morocco. Using the five road safety pillars as a guide in the review process, the case studies provide deeper insight in the road safety situation in these three OIC member countries. The results of the case studies are presented in Chapters 9-11.

2.5 Synthesis

The data collection phase has provided a strong base for defining conclusions and recommendations. Three typical road safety development phases have been defined, with

typical characteristics per phase, categorised per the defined road safety pillars (see Chapter 5). The phased road safety development approach facilitates defining targeted road safety policy measures for (groups of) OIC member countries in addition to general recommendations that apply to all OIC member countries. Conclusions and recommendations are presented in Chapter 12.

3 Road Safety Management

In 2009, the World Health Organization and the World Bank published the report 'Global Status Report on Road Safety – Time for Action', highlighting the growing public health burden of road fatalities in the developing world (World Health Organisation, 2009). The report made a powerful case for urgent measures to address the problem as a global development priority. This report was the first in a series of annual reports on road safety published by WHO. These reports show that low- and middle-income countries have higher road traffic mortality rates than high-income countries. Over 90% of the world's fatalities on the roads occur in low-income and middle-income countries, which have only 48% of the world's registered vehicles. Furthermore, half of those that die in road crashes are pedestrians, cyclists or motorised two-wheelers, collectively known as vulnerable road users – and this proportion is higher in the poorer economies of the world.

The WHO and World Bank findings and recommendations contained in the above-mentioned reports provided a consensus-based blueprint for country, regional and global action and were subsequently endorsed by the United Nations General Assembly Resolutions 56/289, 60/5 and 62/244 (Improving Global Road Safety) and World Health Assembly Resolution WHA 57.10 (Road Safety and Health).

The more recent outcome or implementation plan for the above process was known as the Decade of Action for Road Safety, 2011 – 2020 (United Nations, 2011) with five specific road safety pillars addressing road safety management, safer vehicles, safer road users, safer roads and emergency response.

3.1 International Cooperation and Partnerships

Efficient and effective implementation of the WHO and WB recommendations require countries to work in partnership with the international development community to scale up, refocus and harmonise their road safety activities, with an emphasis on managing for results. As an overarching priority, institutional capacity building at global, regional and country levels must underpin this endeavour if improved country road safety performance is to be sustained in the longer term.

The guidelines first set out in the recommendations of the First Global Status report (World Health Organisation, 2009) and later in the UN's Decade of Action, provide a sequential process that is vital to success. Safety management capacity reviews, based on the procedures developed for the World Bank (Bliss & Breen, 2009) and later to be incorporated in the International Standard for road traffic safety management (ISO, 2012), are deemed and essential first steps in building a multi-sectoral framework for dialogue between all relevant partners and stakeholders at country, regional and global levels. Capacity review findings will specify the position and role of organisations responsible for road safety management (the lead agency), strengthen the long-term investment strategy and identify (Safe System) projects required to improve country safety outcomes on a sustainable basis.

The procedures developed for conducting capacity reviews incorporate a model that is today considered state of the art (Bliss & Breen, 2009; Howard et al., 2010; ISO, 2012; Schermers, Labuschagne & Botha, 2013). The World Bank procedures have been specifically developed so that these apply to all countries, irrespective of the state of road safety development. It is one of the first integrated approaches to assessing the state of road safety in a country. It is also the first approach that has been adopted as the framework for an international standard on road safety management.

3.2 The Safe Systems Approach

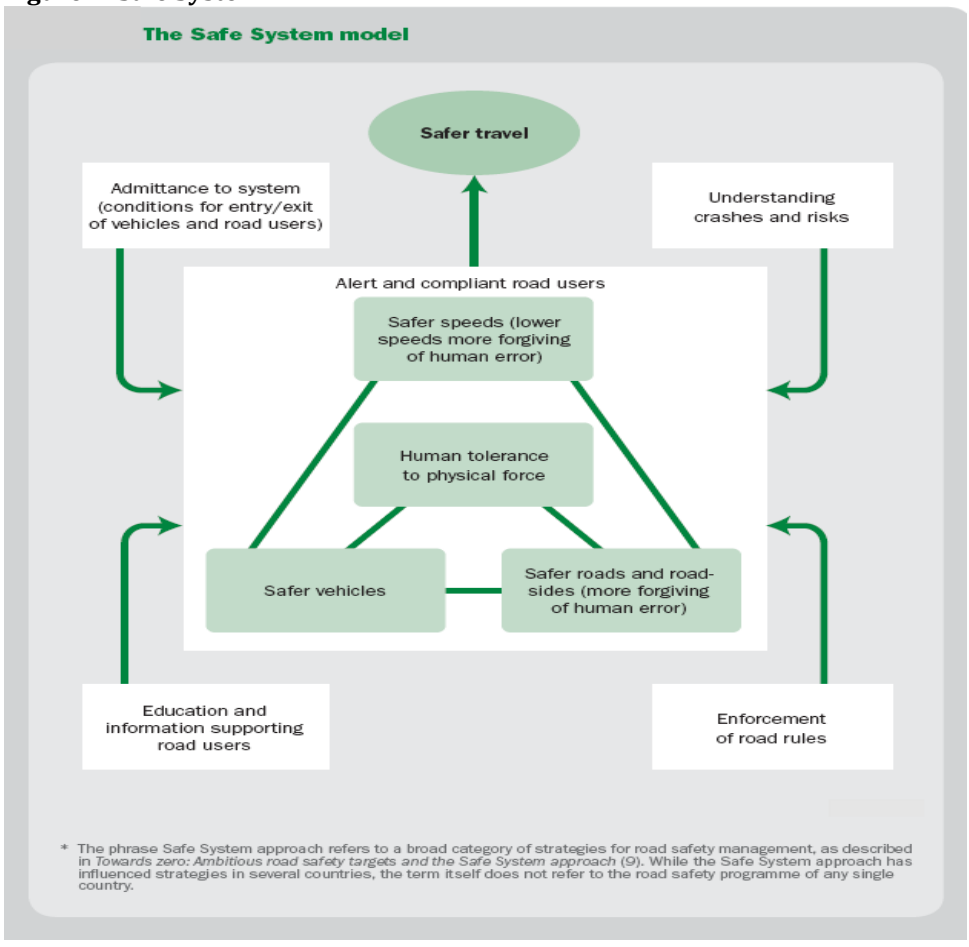
The Safe System approach was conceptualised with the introduction of the Dutch Sustainable Safety approach (Koornstra et al., 1992; Schermers, 1999; Wegman & Aarts, 2006) and the Swedish Vision Zero (Tingvall & Haworth, 1999). This thinking laid the foundation for the recommendations developed by WHO (World Health Organisation, 2009) and United Nations (United Nations, 2011) and was incorporated into the OECD report "Towards Zero" (OECD, 2008) and the World Bank Country Guidelines for the Conduct of Road Safety Management Capacity Reviews (Bliss & Breen, 2009). The World Bank guidelines were developed specifically to promote the Safe Systems Approach and to introduce road safety capacity reviews as a first step to redress the growing road safety problems.

The underlying principle of the Safe Systems Approach is that the entire transport system is designed around the limitations of the road users (Koornstra et al., 1992; OECD, 2008; Tingvall & Haworth, 1999; Wegman & Aarts, 2006). It must be designed to accommodate and compensate for human error. In other words, a safe system accepts human failures and mitigates for these accordingly. A Safe System has the following characteristics (adapted from OECD, 2008):

- Road users that make mistakes, irrespective of efforts designed to prevent incidents.
- Designers and operators of the road transport system that accept and embrace a shared responsibility for the safety of the system.
- Users of the road transport system that accept the responsibility to use the system as it is intended to be used, adhering to rules and regulations.
- Safety management decisions that are aligned with other transport and related policy goals and decisions (i.e. road safety management does not occur in a vacuum and takes into account the broader transport related economic, human and environmental goals).
- Road safety interventions that aim at meeting long term goals.

The Safe System approach aims to minimise crashes and where these cannot be avoided, to ensure that the level of injuries are minimised to the extent that fatal and serious injuries are prevented, as illustrated in Figure 2.

Figure 2: Safe System



Source: Austroads, 2013

Safety interventions should target the highest concentrations of death and injuries on the road network to achieve rapid and demonstrable improvements. Obviously the approach is driven by measures of effectiveness and cost-benefit analyses and strives to demonstrate the highest gains in terms of crash reduction at the lowest possible cost. The absence of reliable death and injury data must not impede taking urgent action, but the building of countrywide data systems should be an immediate focus.

Dialogue must also be initiated and sustained with international partners and stakeholders to foster global and regional partnerships that can scale up and accelerate the process of building the scientific, technological and managerial capacities required to prepare and implement innovative and cost-effective road safety programs at the country level.

The Austroads Guide to Road Safety (Austroads, 2013) which was developed in Australia, promotes a Safe System approach to road safety and has been produced for use in any country irrespective of its development status or road safety performance. They draw on the World

Report findings and provide a management framework to guide the implementation of its recommendations. Further updates are planned, based on the experience gained with their application in low, middle and high-income countries.

Road safety management systems have evolved in high-income countries over the last fifty years and the challenge for low and middle-income countries will be to benefit from the lessons learned, to avoid the unnecessary and unacceptably high level of fatalities and injuries experienced in high-income countries. This system requires low and middle-income countries to shift rapidly and directly to a Safe System with a results focus which aims to eliminate road deaths and serious injuries, rather than chart a fatalistic pathway that accepts these impacts as an inevitable price of economic progress.

The Safe System approach is also well attuned to the global, regional and country development goals of sustainability, harmonisation and inclusiveness. The Safe System approach is dedicated to the elimination of deaths and injuries that undermine the sustainability of road transport networks and the communities they serve. It focuses on safer and reduced speeds, and also harmonizes with other efforts to reduce local air pollution, greenhouse gases and energy consumption. Its priority to afford protection to all road users is inclusive of the most vulnerable at-risk groups such as pedestrians, young and old, cyclists and motorcyclists. These co-benefits of shifting to a Safe System further strengthen the business case for its implementation.

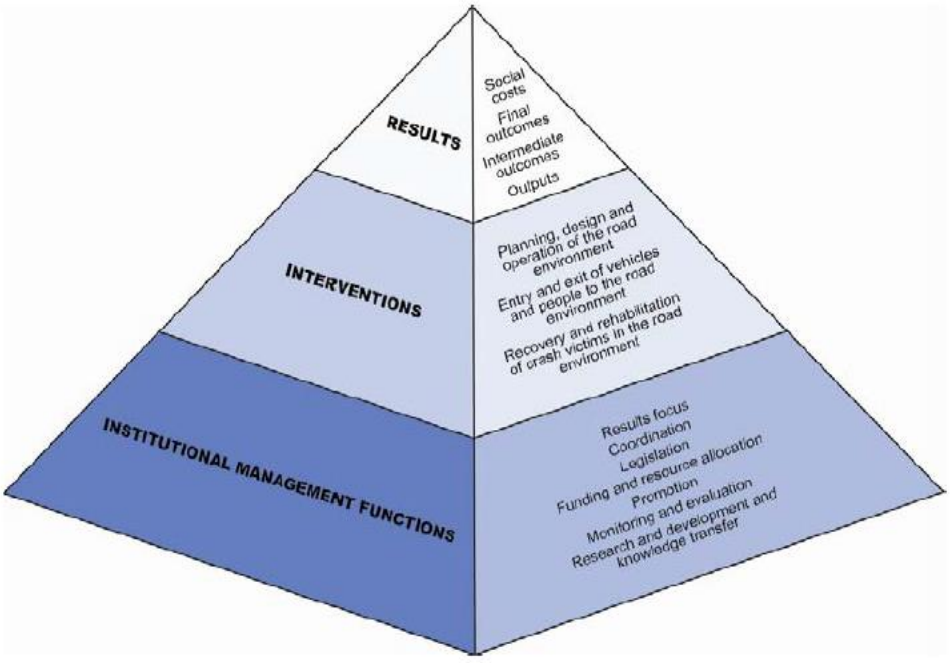
The long term goal for the Safe Systems Approach is the elimination of fatal and serious injury crashes. It is a long term goal requiring a comprehensive and integrated set of coordinated interventions that cannot be achieved in the short to medium term. Such a long term goal is best supported by traditional interventions which target specific road safety problems, often on the short to medium term. The Dutch Sustainable Safety programme was the result of an integrated and coordinated approach combining both short term interventions aimed at immediate problems and longer term interventions requiring a fundamental change in which road infrastructure was provided and operated (Schermers & Vliet, 2001; Wegman & Aarts, 2006; Weijermars & van Schagen, 2009).

3.3 Road Safety Management System

Effective road safety programmes rely on effective road safety management. The effectiveness of road safety management is dependent on the institutional capacity available for developing and implementing effective strategies and interventions. An effective road safety management system is focussed on achieving results and there must be a clear focus on achieving stated targets. In this road safety management model (based on that developed by the Land Transport Safety Authority in New Zealand) there are three layers; results at the highest level which depends on interventions on the middle level which in turn depends on the institutional management functions at the lowest level. This pyramid model distinguishes itself from most other traditional road safety management approaches in that it does not only focus on interventions. It provides a holistic framework which assigns responsibility for road safety

policy implementation, provides for the delivery of interventions and ensures accountability for the results.

Figure 3: A Road Safety Management System



Source: Koornstra et al., 2002; LTSA, 2000; OECD, 2008

The model identifies seven institutional management functions which are deemed essential for a country to achieve the desired results (OECD, 2008). Results focus provides the strategic focus, linking the implementation of interventions to the intermediate and final outcomes. Results focus requires government to take ownership of the road safety problem and to appoint a responsible organisation/department/body to work with other authorities and organisations to:

- Develop management capacity to understand a country's road safety issues.
- Provide a comprehensive strategy with intermediate and outcome targets.
- Deliver interventions and target achievements.
- Review performance.
- Coordination of the key agencies to develop and deliver road safety policy and strategy.
- Effective legislation to enable desired results to be delivered.
- Adequate funding and well-targeted resource allocation for interventions and related institutional management functions.
- Promotion of road safety within the government and the broader community.
- Robust and systematic monitoring and evaluation to measure progress.
- Proactive research and development and knowledge transfer programmes which actively influence improvement in interventions, institutional management functions and performance monitoring.

To effectively manage road safety requires commitment to a results focused approach. This commitment plays a critical role in the success or failure in meeting a country's road safety ambition and related targets. Without a clear national political will to commit to road safety improvement, the chances of successfully implementing an effective road safety management system are slim.

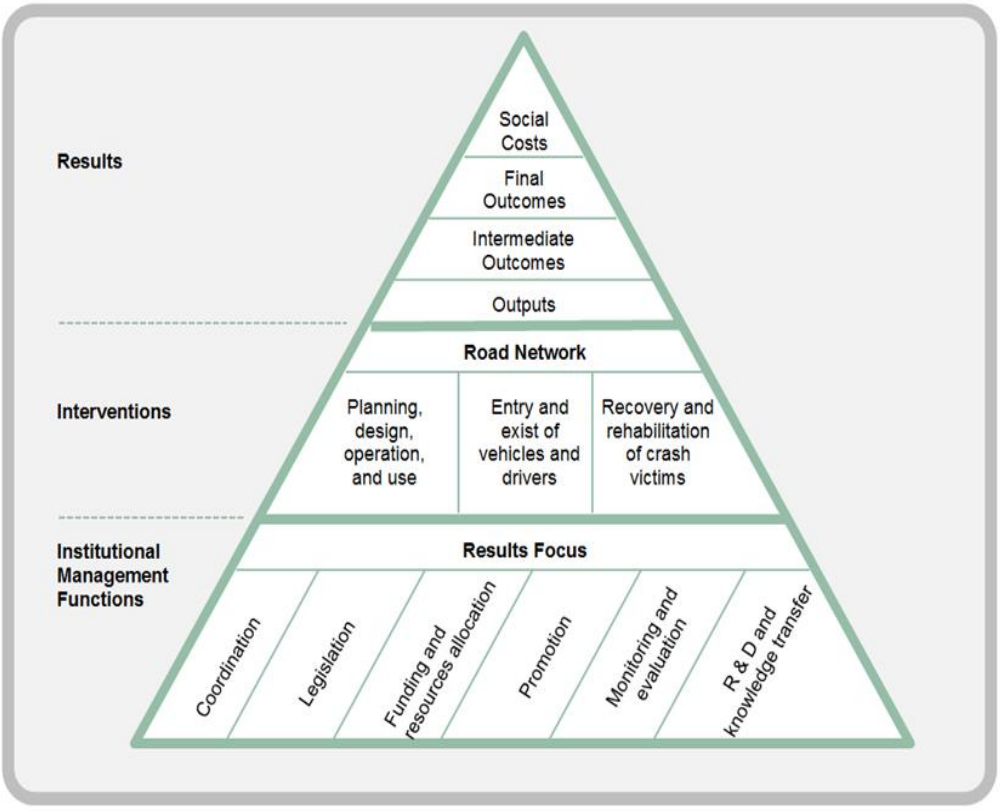
3.4 The Road Safety Management System in Operation

The World Report on Road Traffic Injury Prevention issued by the World Health Organization (WHO) and the World Bank in 2004, called for a drastic improvement of global road safety. It recommended a range of urgent measures essential for a sustainable reduction of the social and economic impacts of road accidents.

These recommendations have since been mandated by the UN General Assembly with the release of the Decade of Action for Road Safety. The World Bank has since commissioned the development of Guidelines for conducting road safety capacity reviews (Bliss & Breen, 2009) to assist countries to implement these recommendations.

These guidelines incorporate a Road Safety Management System (RSMS) that was derived from the pyramid model developed in New Zealand (LTSA, 2000) and applied in the SUNflower projects (Koornstra et al., 2002; Morsink et al., 2005). Although there are other reports that describe the Safe Systems Approach, for example the OECD Towards Zero - Ambitious Road Safety Targets and the Safe System Approach (OECD, 2008); the methodology described in the SUNflower project (Koornstra, et. al 2002) and the Sustainable Safety approach (Wegman and Aarts, 2005), the Road Safety Management System (RSMS, see Figure 4), developed for the World Bank (Bliss and Breen, 2009) has many generic components that allow for it to be applied to all countries and irrespective of the status of development or road safety performance in that country. The guidelines introduce a systematic review process that is supported by checklists and questionnaires. Although the guideline is intended for general use, the review process described assumes the input of road safety experts and not merely a mechanistic process of following a checklist or completing a questionnaire and trusting the outcomes. The reviewers must have a thorough understanding of road safety and be able to probe and investigate issues underlying reported problems. That requires experience, knowledge and understanding of all aspects related to road safety and road safety management.

Figure 4: Road safety management system



Source: Breen and Bliss, Building on the frameworks of Land Transport Authority, 2000; Wegman, 2001, Koornstra et al. 2002; Bliss, 2004

These generic characteristics of the World Bank RSMS are as follows (adapted from Bliss and Breen, 2009):

- The RSMS deals with road safety as a production process in the same approach one would deal with the production of any other goods or services. This production process is depicted as a management system comprising three levels, namely institutional management functions which produce interventions that in turn produce results.
- The RSMS is a generic model that is neutral to country structures and cultures which shape the way institutions function and goals are set and achieved.
- The management system can be used to review road safety management capacity and prepare related strategies and programs, irrespective of the stage of road safety development in the specific country.
- The RSMS can be applied to any land use/transportation system. The current and projected exposure to risk arising from that system is taken as a given. However, land use/transport trade-offs can be managed by considering these as options in the desired focus on results. These can then be addressed by interventions related to the planning, design, operation and use of the road network and the entry and exit of vehicles and road users to this network.

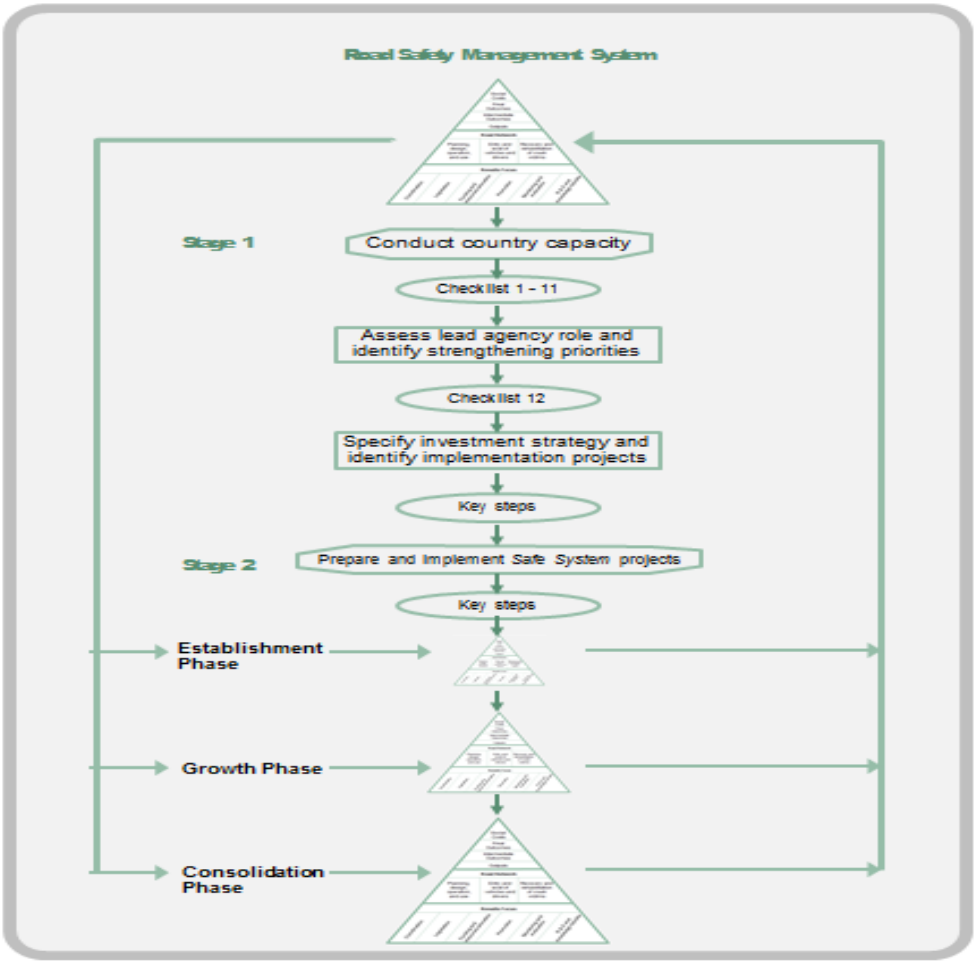
- The model takes the road network as its frame of reference. The interventions are directly associated with the road network and have strong spatial dimensions. The difference between this approach and models based on safer roads, safer vehicles and safer people is that these are placed specifically in the network context where injury related crashes occur. The model focuses on safety interventions to prevent network failures and near failures as is the case with, for example, air transport.

The World Bank and WHO report (Bliss & Breen, 2009) provides implementation guidelines for road safety management capacity review projects. As mentioned earlier, an important consideration in applying the model is that a fundamental understanding of the current road safety situation and climate in the particular country is needed.

Figure 5 shows the implementation stages recommended by the guidelines. Ideally each member country in the OIC should follow these implementation guidelines in assessing and/or establishing road safety management systems. As mentioned, the review process uses a series of checklists (see Appendix 2) as a basis for collecting the required data. The checklists have been generalised and designed to cover all the aspects described by the road safety management model. There are 11 checklists covering aspects relating to the results, interventions and institutional management functions. A twelfth checklist has been designed to assess the performance and role of a lead agency.

The current project is aimed at assessing the state of road safety management in member countries of the OIC. Due to a limited budget, full scale capacity reviews as described by the World Bank guideline (as depicted by Figure 5) are not possible and the review will for the largest part be based on a review of current practice as described in available (English) documentation supplemented by questionnaires and interviews in a select number of countries. However, the process described by the World Bank guideline provides the evaluation framework for the study although the evaluation in this study will be at much lower level of detail. The purpose is an illustrative comparison of the state of road safety management at a fairly global level across OIC member countries, across OIC regions and with non-OIC member countries that are considered to practice state of the art Road Safety Management. For this reason an overview of the World Bank approach is provided as the backdrop against which this review is provided.

Figure 5: Implementation stages

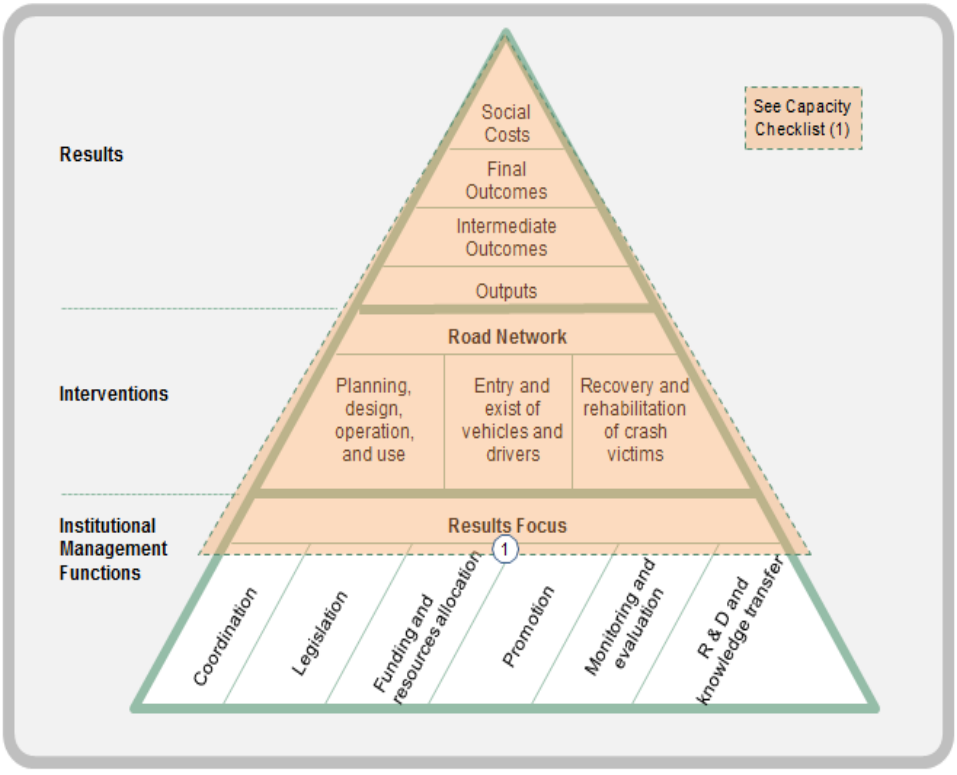


Source Bliss and Breen, 2009

3.4.1 Appraising results at the system level

The first step in the review process is to assess current road use and operation of the road network. Checklist 1 of the World Bank guidelines (Bliss & Breen, 2009), which is presented in Appendix 2, covers questions that aim to inform discussions regarding the current performance of the road (safety) system. It aims at identifying results at a systems level.

Figure 6: Assessing results at the system level



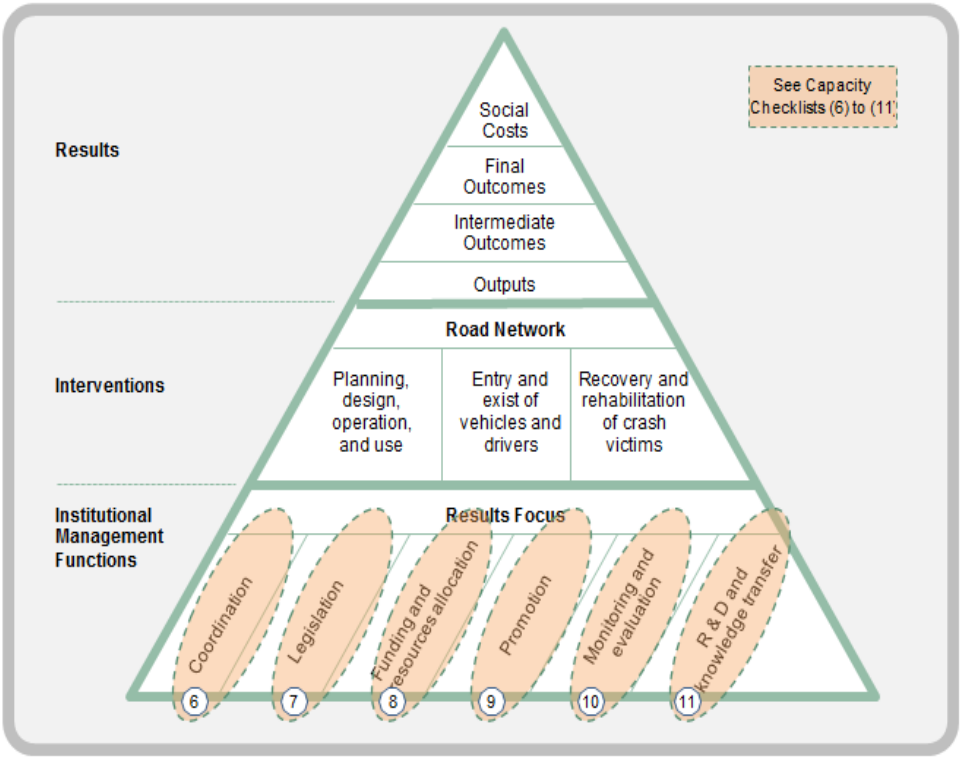
Source Bliss and Breen, 2009

Checklist 1 provides the framework with which the reviewer can decide to investigate specific matters in more detail. It is essentially an initial probe to determine sources of data and where these are not available, local experts must be consulted to identify high risk user groups, dangerous road sections, critical offences etc.

3.4.2 Assessing results focus at the institutional management level

A primary objective of the World Bank review process is aimed at assessing the legal, institutional and organisational setting of road safety management. Following from the initial system level appraisal, the institutional management functions are appraised using Checklists 6 to 11, as included in the World Bank guidelines (Bliss & Breen, 2009). The checklists provide a basis for developing questions and exploring issues that enable assessing the current institutional management functions and linking these to the desired interventions and their focus.

Figure 7: Assessing results focus at the institutional management function level



Source Bliss and Breen, 2009

In this assessment the questions serve to guide an in-depth review of the current status relating to the primary institutional management functions a lead road safety agency should perform. The questions serve to measure the various dimensions of these functions. As a collective they give an indication of a country's capability and capacity with respect to road safety management. These institutional functions are results orientated and driven by measurable targets and goals.

In an ideal situation the strategic orientation is such that all actual and potential interventions are linked to results, analyses reveal targets, and set out a performance driven management framework for the implementing interventions and attaining their intermediate and final outcomes. This strategic orientation is not merely a visionary statement or goal, but a measurable expression of where the country wants to be, how it plans to get there and how it plans to measure getting there. It is performance driven and goals and targets are monitored to assess the actual performance. The overarching results focus incorporates six institutional management functions, namely:

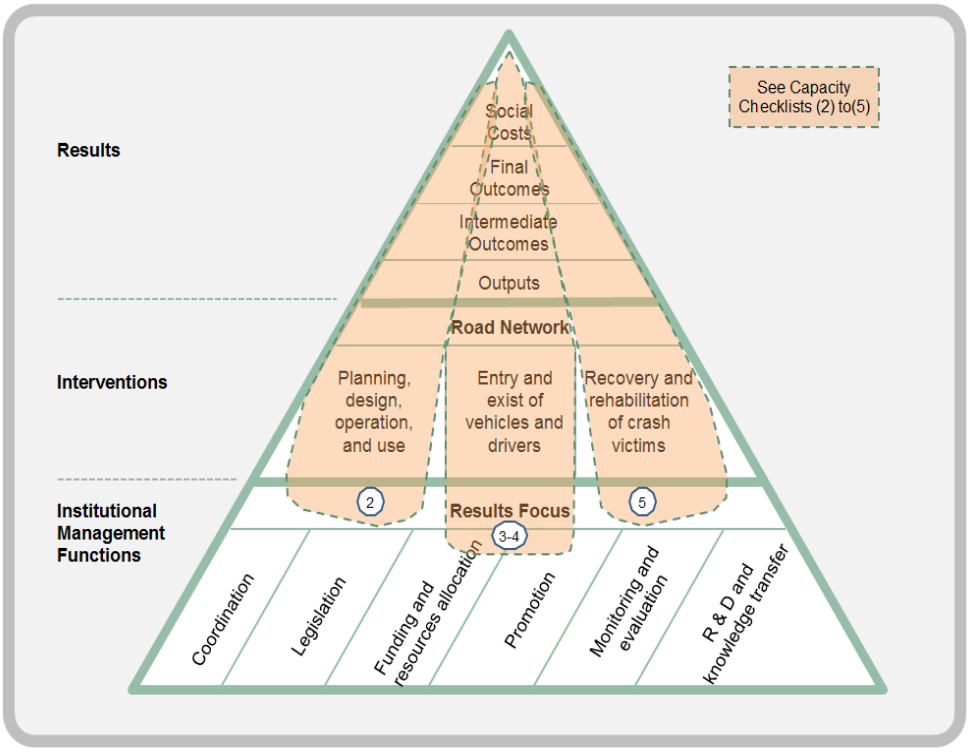
1. **Coordination**
   This relates to how the country organises and manages its interventions and efforts aimed at redressing road safety problems across national, regional and local government and civic society, private sector and other organisations.

2. **Legislation**
   This defines the legal framework from within which the organisations and institutions responsible for road safety must function. It defines the responsibility, accountability, intervention and associated institutional management functions needed to achieve the desired result.
3. **Funding and resource allocation**
   This relates to financing the operational budget/s of the organisation/s responsible for road safety management and the associated interventions needed to achieve the intended results in a sustainable manner. It also pertains to the efficient allocation of resources based on a rational evaluation framework (i.e. based on quantitative assessment of cost and benefit in relation to stated objectives).
4. **Promotion**
   This relates to the process of communicating with the public on road safety matters and should be a core business of government and society to emphasise the shared social responsibility to develop, implement and support road safety improvement initiatives and interventions that aim at meeting stated targets.
5. **Monitoring and evaluation**
   Monitoring and evaluation deals with the on-going and systematic measurement of road safety performance measures and indicators in order to assess and evaluate the efficacy of introduced measures and interventions.
6. **Research and development and technology transfer**
   This is an integral and essential component of any road safety management system. It relates to the timely identification of changes in the system, the development of new techniques and methods, the application of new knowledge and the transfer and application of knowledge to continually improve the efficiency and effectiveness of the system in order to keep meeting the desired results.

3.4.3 Assessing results at the interventions level

Informed by the systems and institutional management level appraisals, Checklists 2 to 5 of the World Bank guidelines (Bliss & Breen, 2009) are used to assess the results at the intervention level (see Figure 8). The review focusses on the three broad intervention areas (planning, operation, design and use; vehicles and drivers; and recovery and rehabilitation of crash victims). The purpose of these questions is to probe for relationships between the intervention and their outputs, preferably in the form of quantifiable relationships backed by documented studies or research and focusing on safe road design, operation and maintenance; safe roads and roadsides; safe speeds and safe vehicles; emergency response and emergency (trauma) centre protocols and practices.

Figure 8: Assessing results focus at the interventions level



Source Bliss and Breen, 2009

Current international best practice in the field of road traffic safety is dictated by the concept of the Safe System approach as outlined earlier. Specifically with respect road traffic safety management as outlined by the Pillar A of the UN Decade of Action (UN, 2010) there are specific requirements outlined by both the Country Guidelines and the international standard ISO 39001 on Road Traffic Management (RTM) Systems (ISO, 2012).

3.5 International Standard on Road Traffic Safety Management Systems

The ISO 39001 International Standard, 'Road Traffic Safety (RTS) Management Systems - Requirements with guidance for use', specifies requirements for a management system for specifically road traffic safety. It provides a framework for the responsible organisation to develop and implement appropriate road traffic safety policy, objectives and action plans and taking into account legal and other requirements. The sole purpose of the standard is to address road traffic safety management within organisations that wish to:

- Improve road traffic safety in their organisation;
- Establish, implement, maintain and improve a road traffic safety management system;
- Assure itself of conformity with stated RTS policies; and
- Demonstrate conformity with this international standard.

It is, however, important to note that the standard does not serve to try to standardise RTS or suggest uniformity in the structure of RTS management systems or documentation. It addresses purely RTS management.

Although also applicable to road authorities and leading agencies, the standard has a larger target audience. It is formulated very much with a view to getting companies (private and public) to adopt the standard as a working procedure. This is aimed at specifically creating road safety awareness within the workplace and making that a specific responsibility within these organisations. However, the standard can be broadly applied and the principles and requirements outlined apply equally to a lead agency responsible for road safety.

3.5.1 Context of the organisation

The ISO standard stipulates that organisations responsible for road safety management must define their roles in the road traffic systems, identify processes, procedures and functions of the organisation that will impact on RTS and finally determine the sequence and interaction of these.

The organisation is also expected to understand the market it serves, specifically the needs and stakeholders and other parties involved in road traffic safety. To do this the agency must identify who these parties and stakeholders are, determine their requirements and determine the legal and other requirements related to RTS to which the organisation subscribes.

The ISO 39001 standard requires that the lead agency establishes and maintains a RTS management system. This system is intended to be a dynamic system which is continually adapted and amended to meet changing demands of the road safety environment.

A prime function of a lead agency is to establish its outcomes, i.e. the RTS management system must strive to reach tangible targets, ultimately based on an approach towards zero deaths and serious injuries. The agency or organisation must therefore determine the scope of its management systems, particularly related to its role in road traffic safety and the requirements of its partners and stakeholders.

3.5.2 Leadership

The ISO 39001 standard stipulates that top management of an organisation shall ensure that RTS policies and objectives are established in accordance with the strategic direction of the organisation. The RTS management system must be integrated into organisational business processes and be supported by whatever resources that may be required to drive it. Top management shall display leadership by adopting a towards zero road safety reduction goal and by setting out clear short term targets and plans. The organisation will work closely with its partners and top management will ensure that it establishes sustainable coordination structures to attain the RTS goals and objectives. Top management has the responsibility of assigning responsibilities and authorities for relevant roles and functions within the organisation.

The organisation will develop its strategic actions and implementation plans based on sound management information and prioritise these in order to achieve the intended outcomes. The

implementation will be monitored and focussed on achieving results (results driven). The processes in doing this will be transparent and open and communication internally and externally of these is an important function of top management. Equally important is that top management ensures that the importance of compliance with laws relevant to achieve the intended outcomes of the RTS management system is communicated and understood by its entire staff.

The leadership of the organisation shall provide the necessary resources to establish, implement, maintain and continually improve the RTS management system. The leadership must furthermore stimulate its staff to strive for the RTS goals and set personnel targets and benchmarks as part of performance appraisal (individuals will be stimulated to be results driven and evaluated accordingly).

Top management will establish RTS policy which is appropriate to the organisation; provides the framework for setting objectives and targets; shows commitment to satisfy applicable requirements and continual improvement of the system. The policy shall be documented and publicly available and shall be communicated to the entire organisation.

3.5.3 Planning

The ISO 39001 standard stipulates that the lead agency/organisation shall review RTS performance, determine risks and opportunities, select RTS performance factors to work on, analyse what is achievable over time and sets appropriate RTS objectives, targets and implementation plans to achieve these. The performance shall be quantified and future impacts assessed.

The organisation shall plan actions to address risks and opportunities and integrate these into the RTS management processes and it shall also evaluate the effectiveness of such actions.

The standard provides a list of RTS performance factors (risk exposure; final safety outcomes and intermediate safety outcomes) which organisations have to select a number (or all) of depending on the context of the organisation and the risks and opportunities it has identified. These factors are listed below.

Risk exposure factors

- Mobility data (distance travelled and traffic volumes by mode and road user type);
- Volume of product or service provided by the organisation.

Final outcome factors

- The number of deaths and serious injury crashes and victims.

Safety Performance Indicators (SPIs, referred to as Intermediate Safety Outcome Factors in ISO 39001). These relate to the safe planning, design and use of the road network and all aspect associated with that and include:

- Road design and safe speeds, with special attention for separation (in time or space) of travel direction and road users, roadside safety and intersection design;
- Use of appropriate roads, depending on vehicle type, user, type of cargo and equipment;
- Use of personal safety equipment, especially seat belts, child restraints, bicycle and motorcycle helmets, visibility and means for road users to be seen;
- Safe driving speeds, and taking into account vehicle type, traffic and weather conditions;
- Fitness of drivers, especially fatigue, distraction, alcohol and drugs;
- Safe journey planning, including trip motives, the amount and mode of travel, choice of route, vehicle and driver;
- Safety of vehicles, especially occupant protection, protection of potential crash partners (especially vulnerable road users), crash avoidance and mitigation, roadworthiness, vehicle loading and capacity and securing of loads in and on the vehicle;
- Driver licensing and authorisation of to drive particular class of vehicle;
- Removal of unfit vehicles and/or drivers from the road network; and
- Post-crash response and first aid, emergency preparedness and post-crash recovery and rehabilitation.

Once the above factors have little or no relevance (i.e. problems are resolved) the organisation shall identify suitable replacement factors that address underlying problems at that time.

The SPIs shall be monitored and reported regularly (i.e. must remain actual). In order to monitor performance the organisation shall establish RTS objectives at relevant functions and levels. Objectives shall be consistent with policy; be measurable (if possible); take into account applicable requirements; be monitored; communicated and regularly updated.

As part of the planning process the organisation shall establish what must be done; what resources are required; who is responsible; when the task is to be completed and how the results will be evaluated.

3.5.4 Support and coordination

The organisation is expected to coordinate both internally and externally to achieve its goals. The organisation must ensure that internal and external consultation and coordination of its activities takes place in support of its goals, targets and implementation plans.

According to the standard the organisation shall "determine and provide the resources (human resources, specialised skills, organisational infrastructure, technology and financial resources) and allocation framework needed for the establishment, implementation, maintenance and continual improvement of the RTS management systems to achieve the established objectives and targets".

The organisation must determine the competences required to support the RTS management system and see that these persons have the necessary education, training and experience and where necessary take action to supplement this. Periodic performance reviews will be required

to evaluate the effectiveness of staff and the actions taken. It is important that competence reviews are documented.

Staff directly or indirectly involved with the RTS management system must be made aware of the RTS policy, the implications of not conforming to the systems' requirements and lessons learnt from experiences of the organisation regarding major traffic incidents or developments.

Furthermore the organisation shall have a communication strategy regarding the RTS management system and at least cover what it communicates, when it communicates and with whom it communicates.

A requirement of the standard is that information regarding the RTS management system is well documented and that includes documentation required by both the standard and the organisation and its stakeholders themselves. The extent of the documentation is determined by the size of the organisation, the complexity of the processes and the competence of staff involved.

However, the following requirements are stipulated:

- When creating and updating documented information this shall at least have an identification number and description (title, date, author and/or reference number), a suitable format (e.g. language, software version, graphics) and media (paper/electronic) and a review and approval process indicating adequacy; and

- Documented information shall be controlled so that it is available for use whenever needed and be suitable protected (copyright, use, confidentiality, etc.). For control purposes the organisation must pay particular attention to document distribution, access, retrieval and use; storage and preservation (incl. legibility), changes or modifications/errata, retention and disposition.

3.5.5 Operations

The standard requires that the organisation determine, plan, implement and control the processes to meet the requirements of the standard specifically by establishing criteria for these processes; implementing controls of the processes and keeping documented information so that it can be determined if the processes have been carried out as planned.

Furthermore, the organisation shall respond to actual fatalities or serious injuries caused by road traffic crashes or incidents in which the organisation is involved and where possible prevent or mitigate adverse effects. The organisation shall review its preparedness to respond to these developments and assess the efficacy of remedial procedures. The procedures shall also be tested where possible.

3.5.6 Performance evaluation

The standard stipulates that the organisation shall determine what needs to be monitored, how that monitoring will take place (measured, analysed and evaluated), when monitoring will take place, when results are analysed and evaluated and reported.

The standard also requires that the organisation develop procedures and process to record and document road traffic (fatal and serious injury) crashes and incidents in which the organisation itself is involved in. These are to be analysed and underlying causes identified, remedied and opportunities identified to implement preventative strategies.

Top management shall periodically review the performance of the organisational goals and strategies and targets. These management reviews shall consider status of actions from previous reviews, changes in the internal and external environments, information on the RTS performance including trends in non-conformance and corrective actions, monitoring and evaluation, meeting of targets and goals, etc. identify opportunities for continual improvement (specifically chances for technology), relevant communications with stakeholders and other parties (including complaints) and data relating to crashes and investigations.

3.5.7 Improvement

In the event of non-conformity to the requirements of the RTS management system the organisation is expected to implement corrective action plans and to deal with the consequences of the event. The organisation must evaluate the case and develop countermeasures to ensure it does not occur again or that risk is minimised. If remedial steps are implemented these must be monitored and the effectiveness evaluated and documented.

Finally the organisation is expected to have a programme aimed at the continual improvement of the RTS management system.

3.6 The United Nations Decade of Action for Road Safety

Based on the 2009 recommendations of the Commission for Global Road Safety, the United Nations General Assembly Resolution 64/255 (United Nations, 2011) decreed the period 2011-2020 as the decade for action for road safety. The resolution requested the United Nations Regional Committees and the World Health Organisation to prepare a Plan of Action which would support the implementation of its objectives. This culminated in what is today known as the Global Plan for the Decade of Action and which presented a framework to coordinate activities on regional and global levels. The Global Plan is intended for not only the road authorities but the road safety community at large, including private companies and civil society. The document encourages accelerated investment in road safety in low and middle income countries, supported by sustainable road safety strategies and programmes. It highlights the need for increased political support and resource investment.

The plan relies on the underlying Safe Systems principles as adopted in the Decade of Action. The approach aims at developing a road transport system that accounts for human error and

the vulnerability of the human body. The premise is that humans continue to make mistakes and crashes cannot be totally avoided although their impact (in terms on injury outcomes) can be mitigated by providing safe and forgiving roads and vehicles. Road users have the responsibility of abiding for rules and regulations. This is all supported by a legal and judicial system, including effective enforcement capacity, emergency care and incident management systems, training facilities, funding systems, research and monitoring functions as required by a Safe Systems Approach.

Harmonisation of road safety legislation across country borders is seen to be vitally important to achieving success.

3.6.1 Specific goal and objectives

The Global Plan (United Nations, 2011) has as its primary goal the stabilisation and reduction of traffic fatalities by 2020. It lists eight specific objectives which are expected to attain this goal: These are:

1. Adopting and adhering to the major UN road safety agreements and conventions;
2. Developing and implementing road safety strategies and programmes;
3. Setting of realistic road safety targets for 2020 by building on existing frameworks;
4. Strengthening road safety management capacity and infrastructure to facilitate the technical implementation of road safety activities at all levels;
5. Improving the quality of road safety data (collection);
6. Monitoring and reporting progress of road safety performance indicators;
7. Stimulating and encouraging increased funding, improved resource deployment and inclusion of road safety as an integral component of road infrastructure projects; and
8. Building capacities at all levels (regional to international) to address road safety.

3.6.2 Activities

The plan proposes five pillars to support the activities at local, national, regional and local levels. The pillars into which the activities are grouped are:

- Pillar 1: Road Safety Management;
- Pillar 2: Safer Roads and Mobility;
- Pillar 3: Safer Vehicles;
- Pillar 4: Safer Road Users;
- Pillar 5: Post-crash Response.

The plan proposes a number of national activities under each pillar and these are intended to guide countries (and regions) to develop action plans and these serve as a framework which should be incorporated into country specific policy and strategy. To a large extent this framework also provides the foundation used by the WHO to compile the country reports contained in its road safety status report and this will also form the basis of the evaluation adopted by this COMCEC study.

Under *Pillar 1: Road Safety Management* there are six primary activities identified:

1. Adhering and implementing UN agreements and conventions including the Convention on road Traffic (1998); the Convention and signs and Signals (1968) and the AETR (1970).
2. Establishing a lead agency responsible for road safety.
3. Develop a national road safety strategy, the implementation of which is to be co-ordinated by the lead agency.
4. Setting of realistic long term road safety targets aimed at performance improvement and gains.
5. Identifying and securing sustainable national funding sources (including aspects such as applying 10% of road infrastructure budgets to road safety improvement; innovative funding; budgeting targets etc.).
6. Establishing reliable and sustainable data collection systems needed to support the evaluation and monitoring of road safety in general but also of improvement projects in particular.

Pillar 2: Safer road and mobility also lists six core activities:

1. Promoting road safety ownership and accountability among road authorities.
2. Promoting the needs of all road users as part of sustainable transport planning, travel demand management and land use management, including making safety impact assessments part of the process, implementing effective access control strategies, etc.
3. Promoting the safe operation, maintenance and improvement of existing road infrastructure by increasing the accountability of road authorities in road safety management (including requiring them to provide detailed analysis of blackspots, remedial programmes and actions; conducting safety assessments and inspections, etc.).
4. Promoting the development of safe new infrastructure that meets the needs of all road users (including the setting of safety standards and requiring road authorities to adhere to these, conducting road safety audits and Network Safety Impact Assessments).
5. Encouraging capacity building and knowledge transfer through partnerships, training and education and development of standards.
6. Encouraging research and development in safer roads through specific research and sharing and interchanging of research findings.

Pillar 3: Safer Vehicles proposes seven core activities:

1. Encouraging member states to apply and promulgate vehicle standards and regulations based on those developed by the UN.
2. Encouraging the implementation of new car assessment programmes throughout the world.
3. Encouraging agreements whereby all new vehicles are equipped with seatbelts and anchorages and that meet regulatory requirements and comply with required crash standards.
4. Encourage the deployment of crash avoidance technology in cars and motorcycles.
5. Encourage the use of incentives for vehicles with high levels of road used protection and discourage use and import of vehicles with lower safety standards.
6. Stimulate the application of pedestrian and other vulnerable road user protection regulations.

7. Encourage government officials to set an example by driving vehicles complying with the highest safety standards.

Pillar 4: Safer road users is aimed at developing and launching programmes for improving road user behaviour and lists the following eight core activities:

1. Increasing the awareness of road safety risk factors and preventative measures and implementing social marketing campaigns to change attitudes and opinions.
2. Set speed limits based on evidence based standards and rules and increase compliance with speed limits to reduce speed related crashes and injuries.
3. Set and seek compliance with drink-driving laws and standards and rules to reduce alcohol related crashes and injuries.
4. As in 2 and 3 but aimed at the wearing of motorcycle helmets.
5. As in 2, 3 and 4 but aimed at the wearing of seat belts and use of child restraints.
6. As in 2, 3, 4 and 5 but aimed at improving operations of commercial and passenger road transport operators and vehicle fleet operators (concept of safety culture).
7. Research and development of policies to reduce work related traffic injuries in the public, private and informal sectors.
8. Promoting the establishment of graduated driver licensing systems.

The final pillar, *Pillar 5: Post-crash response* deals with improving post-crash emergency response and treatment and has seven core activities, namely:

1. Developing pre-hospital care systems incorporating post-crash extraction care, emergency call numbers and good practice guidelines.
2. Develop hospital trauma crash care systems and evaluate care quality.
3. Develop and provide early post-crash rehabilitation care and support to traffic crash victims.
4. Encouraging the establishment of appropriate road user insurance schemes to finance post-crash and rehabilitation costs of crash victims.
5. Encourage crash investigation to support the legal settlement process following crashes and to ensure equitable distribution of costs.
6. Provide incentives and stimulants to help disabled traffic victims gain appropriate employment.
7. Encourage research and development into the improvement of post-crash response and care.

4 Lead Road Safety Agency

The World Bank guidelines (Bliss and Breen, 2009) specify a number of key issues and tasks for lead agencies and define the role of the agency for each of these key issues. This chapter summarizes the key issues; the reader is referred to the guidelines for details.

The tasks and roles provide a reference framework and provide countries the opportunity to assess the state of road safety management in general and the application of the safety systems approach in particular in any particular country. By comparing the defined tasks and roles, using the procedures described by the World Bank guidelines (Bliss & Breen, 2009) to what is actually being done in a country provides a gap analysis which reveals where improvement is required.

4.1 Functional Requirements Related for a Lead Agency - Results Focus

Results focus is the primary function for a lead agency and determines the strategic direction. It aligns policy, strategy and interventions with results and implicit in this is that there are reliable and representative data systems, supporting a performance oriented approach to road traffic safety management.

Table 2 summarises the principal tasks directed at results and describes the role a lead agency should take in each of these should it wish to comply with good practice.

Table 2: The role of the Lead Agency in managing the results focus

Tasks	Lead Agency Role
1. Appraising current road safety performance through high level strategic review	• Manage the process of governmental review of road safety performance; • Identify and bring together key stakeholders and partners that can and will deliver actual road safety results; • Initiate road safety capacity reviews and chair governmental road safety performance reviews; • Prepare reports, papers and bulletins reporting on road safety performance; • Achieve consensus on key problem areas in the road safety management system; • Follows up on agreed actions.
2. Adopting a far reaching road safety vision for the longer term	• Studies and proposes a long term and far reaching road safety vision; • Discusses the road safety vision with government and other partners and stakeholders and society as a whole; • Identifies the key partnerships needed within and outside government for promoting the vision; • Identifies the potential for high-level promotion and championing to underpin the road safety strategy; • Gets agreement on the vision and ensures that this is entrenched in legislation;

Tasks	Lead Agency Role
	• Gets agreement on shared responsibility which is implicit in the far-reaching vision and ensures that this is clearly defined in the national road safety strategy.
3. Analysing what can be achieved in the medium term	• Reviews key road safety problems and the potential for further improvements in consultation with government and other partners/stakeholders; • Draws on local and international research expertise in the reviews; • Identifies information needs for road safety strategy development; • Identifies the key elements of good practice results focus, system-wide safety interventions and improved institutional arrangements using country and international research; • Analyses long-term trends which could affect future road safety outcomes; • Carries out scenario planning and (computer) modelling to develop road safety strategies; • Carries out cost-effectiveness reviews and public acceptability studies of strategy interventions; • Consults with key governmental and other partners and stakeholders within the coordination hierarchy on the multi-sectoral strategy options.
4. Setting quantitative targets by mutual consent	• Sets up a road safety strategy unit within the lead agency; • Sets up technical support groups for the target-setting process; • Proposes and seeks agreement through its inter-governmental coordination arrangements on challenging but achievable targets for final outcomes, intermediate outcomes and institutional outputs at the national level • In the longer term seeks agreement with regional and local governments on achievable road safety targets and achievable outcomes; • Publishes details of the targets and strategies in which the accountabilities of the different partners and stakeholders are also detailed; • Monitors and reports progress at regular intervals to all involved and adapts and refines intervention output levels where necessary.
5. Establishing mechanisms to ensure partner and stakeholder accountability for results	• Sets out the responsibility of the lead and other agencies to achieve specified road safety results (outcomes and outputs) in annual performance agreements; • Uses Memoranda of Understanding to underline agreements about the way in which the members work together inroad safety matters; • Sets performance based road safety targets and delivery of results as a formal criterion in the performance-driven employment

Tasks	Lead Agency Role
	remuneration package of the lead agency Chief Executive and senior management team; • Encourages outputs and contributions of a wider group of partners and stakeholders based on formal and published declarations of intent to carry out specific interventions which contribute to improved road safety results.

4.2 Functional Requirements for a Lead Agency – Institutional Management

The primary functions of a lead agency are presented below, representing the six institutional management functions, as introduced in Figure 4.

4.2.1 Coordination

Countries that apply the Safe System approach have a lead agency which has as one of its principal functions the coordination of road safety matters within and across all levels of government.

According to the Country Guidelines there are four primary tasks related to coordination and the role of the Lead Agency in this is reflected in Table 3.

Table 3: Lead Agency role in coordination

Tasks	Lead Agency Role
1. Horizontal coordination across central government	• Decision-making on the national road safety targets and strategy; • Identifies the key governmental agencies which need to be brought together to deliver road safety results and to agree on a national road safety strategy; • Proposes and seeks agreement on a decision making hierarchy within governmental agencies and organisational structures and arrangements in support of this; • Establishes the working arrangements of the different levels of the coordination hierarchy from the senior decision making levels to the consultation and thematic support levels; • Secures the support of different levels of management from key agencies to coordination tasks with special emphasis on the senior safety management level which is at the core of the coordination hierarchy; • Convenes and chairs the main committees; • Prepares agendas, minutes and documents for meetings of the different coordination committees; • Prepares Memoranda of Understanding (MoU) to set out the roles and responsibilities of the key agencies and agreements about delivery of the various components of the road safety strategy;

Tasks	Lead Agency Role
	• Identifies and proposes the possible contributions which might be made by different agencies to the national road safety strategy with reference to international good practice; • Organises appropriate follow up to monitor and ensure delivery; • Mobilises resources for the national road safety strategy from as many sustainable sources as possible using the coordination platform; • Proposes and secures a budget for inter-governmental coordination and ensures that sufficient in-house capacity is established; • Establishes a coordination secretariat within the lead agency to provide multi-disciplinary technical support to the coordinating agency and its sub-committees.
2. Vertical coordination from central through to local government level	• Manages vertical coordination between central, regional and local government in support of delivering on stated targets; • Ensures that the roles and responsibilities of the different levels of government for different aspects of road safety are set out in legislation, including a legal duty to act on the part of lower levels of government; • Includes representation of the regions and municipalities in national coordination bodies and arrangements; • Proposes and seeks agreement of legislative requirements for the regions and municipalities to establish coordination arrangements to achieve results; • Establishes funding mechanisms and prepares implementation tools to assist and encourage lower levels of government in carrying out results-based interventions identified in the national road safety strategy; • Helps to establish community partnerships with local road safety coordinators financed by the lead agency to stimulate local action.
3. Develop and maintain specific delivery partnerships between government, NGO, community and business at the central, regional and local levels	• Identifies, establishes, funds and provides tools for key partnerships between government agencies. It ensures that local and national government and police forces work closely to achieve a common reporting standard where responsibilities for collecting data are devolved. It establishes crash databases and provides advice on data management and analysis; • Makes use of MoU and agreements to cement partnerships between the lead agency and key partners and stakeholders; • Encourages and helps to fund multi-sectoral local partnerships by engaging the key partners and stakeholders to implement good practice interventions;

Tasks	Lead Agency Role
	• Develops tools for use by local authorities such as road safety calendars, safety management systems, crash reduction studies or good practice guidelines, often in association with and support of the appropriate professional or safety organisation; • Engages the non-governmental sector to help deliver results. While effective NGOs are independent and receive funding from a variety of sources to preserve their impartiality, the lead agency is an important source of support; • Establishes or helps to establish new partnerships or organisations in support of the country targets and results focus and supporting institutional management functions; • Provides core funding; technical support and pump priming (government investment in commercial sector to stimulate the economy); • Engages the business sector in support of a range of institutional management functions needed to deliver results; • Establishes a national strategy for work-related road safety and requires safety provision in all in-house transport contracts to stimulate local industry; • Includes business sector representation in the national strategy consultation/reference group in the national road safety coordination hierarchy; • Establishes well-publicised agreements involving companies in key activities in support of the strategy.
4. Parliamentary relations at central, regional and local levels	• Engages and encourages parliamentary relations at central, regional and local levels to ensure support for the desired focus on results; • Provides support to parliamentary liaison staff to aid the process of communication between the executive and Parliament; • Presents an annual report to Parliament on road safety progress; • Encourages through its Ministers the establishment of a dedicated all party road safety committee to champion road safety within the parliamentary process, the media and society at large; parliamentary hearings on aspects of road safety by relevant parliamentary committees; and parliamentary legislation on road safety • Supports the production of road safety guidance for locally elected representatives to encourage local leadership and evidence based practice at the local level in partnership with NGOs, local authority association; • Includes all party parliamentary road safety organisations in the advisory group of road safety coordinating bodies.

Source: adapted from Bliss and Breen, 2009

4.2.2 Legislation

This management function defines the legal framework from within which the organisations and institutions responsible for road safety must function. It defines the responsibility, accountability, intervention and associated institutional management functions needed to achieve the desired result. The legislative function that the Lead Agency will have to support concerns providing the legal instruments necessary to govern road safety management and to specify the legal boundaries of institutions in terms of their responsibilities, accountabilities, interventions and institutional management functions to achieve the desired focus on results. The Country Guidelines define four primary tasks for this function and the lead agency's role in this is defined in Table 4.

Table 4: Lead Agency role in legislation

Tasks	Lead Agency Role
1. Reviewing the scope of the legislative framework	• Periodically conduct reviews to benchmark international good practice, identify necessary legislative requirements for new road safety strategies and adapt the rules and standards according to changing technological advances; • Carry out in-house reviews of the costs and benefits of potential legislative requirements.
2. Developing and updating legislation needed for the road safety strategy	• Reviews different alternatives to achieving specific policy objectives; • Carries out early consultation with government partners within the coordination and consultation bodies. These discussions must anticipate political and other developments and take place well before the subject becomes matter for Cabinet discussion; • Uses its coordination arrangements to ensure progress with legislative development important for the strategy, where the right of initiative rests with other government departments; • Consults with a broad range of stakeholders and the public on proposals for developing and updating enforceable standards and rules; • Puts together small teams of in-house policy experts and legislative experts; • Uses legislative pilots.
3. Consolidating legislation	• Conducts periodic reviews to consolidate key legislation (e.g., vehicle type approval information and road rules which have evolved over the decades) to improve ease of use.
4. Securing legislative resources for road safety	• Finds opportunities for allocating legal resources (amendment, application, etc.) throughout government and parliamentary programs; • Encourages all-party parliamentary interest in road safety through regular engagement and briefing and addressing specifically legislative matters.

Source: adapted from Bliss and Breen, 2009

4.2.3 Funding and resource allocation

This function relates to financing the operational budget/s of the lead agency responsible for road safety management and the associated interventions needed to achieve the intended results in a sustainable manner. It also pertains to the efficient allocation of resources based on a rational evaluation framework (i.e. based on quantitative assessment of cost and benefit in relation to stated objectives). The Country Guidelines have identified two primary tasks and the role of the lead agency with respect to these are summarised in Table 5.

Table 5: Lead Agency role in funding and resource allocation

Tasks	Lead Agency Role
1. Ensuring sustainable funding sources	• Reviews and makes a strong case to government for improved funding mechanisms on the basis of in-house or external benchmarking of international good practice; • Encourages the establishment of dedicated funding sources for road safety, (e.g., from road user fees and road funds), which provide a means of financing road safety outputs from different ministries; and ensures that road safety objectives and management structure for such funds are clearly defined in legislation; • Ensures that opportunities for additional funding from insurance and business sectors are exploited for activity to achieve results by means of establishing levies on insurance premiums and encouraging business sponsorship; • Earmarks funds, wherever possible, from central government to key stakeholders at regional and local levels for key outputs set out in the national road safety strategy; • Manages hypothecated monies from road traffic fines for safety work.
2. Establishing procedures to guide the allocation of resources across safety programmes.	• Reviews and estimates, often with external technical support, the value of preventing road traffic deaths and serious injuries; • Develops and uses a nationally recognised basis for project evaluation based on an economic appraisal of measures using the value of preventing death and serious injury to identify priorities; • Ensures sufficient in-house lead agency capacity for the preparation of safety budgets and allocation of resources based on a cost-effectiveness and cost benefit analyses; • Makes proposals to other governmental partners concerning the content of their annual budgets and ensuring that the annual performance agreements of the key governmental stakeholders reflect their accountability for agreed road safety strategy outputs; • Establishes specific procedures to guide allocation of resources across safety programs; • Makes business cases to coordination bodies and Cabinet for the allocation of resources based on a cost-effectiveness and cost-benefit analyses, recognising that road safety improvements can also meet other governmental objectives.

Source: adapted from Bliss and Breen, 2009

4.2.4 Promotion

Promotion relates to the process of communicating with the public on road safety matters and should be a core business of government and society to emphasise the shared social responsibility to develop, implement and support road safety improvement initiatives and interventions that aim at meeting stated targets. The World Bank Guidelines identify seven primary tasks in which the lead agency responsible for road safety management has a role (Table 6).

Table 6: Lead Agency role in the promotion function

Tasks	Lead Agency Role
1. Promotion of a far-reaching road safety vision or goal	• Has the leading role in promoting the shared responsibility for achieving road safety results by creating and articulating a far-reaching vision and concepts for a safer road traffic system.
2. Championing and promotion at a high level	• Utilises every relevant opportunity to engage the President or Prime Minister in launching national targeted road safety strategies and programs to ensure maximum political authority and publicity; • encourages all Ministers in the road safety partnership to play an active role in creating awareness about road safety challenges and promoting policy initiatives in the media; • Develops and nurtures a core group of leading senior professionals in the road safety field (leading academics, casualty surgeons, chief police officers, interested parliamentarians from all parties, community leaders, etc.) who advocate and forge support for important policy development.
3. Multi-sectoral promotion of effective interventions and shared responsibility	• Stimulates and invests in multi-sectoral promotion of the strategy and evidence-based interventions through existing and new road safety partnerships.
4. Leading by example with in-house road safety policies (e.g. safety culture)	• devises fleet policies for the lead agency based on good practice and encourages wider use; • Specifies road safety demands in the transport contracts developed by the lead agency with organisations (e.g., car rental, taxi hire, and road haulage companies).
5. Developing and supporting safety rating programs and the publication of the results	• Contributes to the development and support of safety rating programs and their organisation together with road user and consumer groups.
6. Carrying out national advertising	• Ensures that regular information is available and accessible on the key road safety problems as well as upcoming policy initiatives to achieve results; • Develops in-house capacity for road safety promotion as well as contracting out targeted road safety advertising in support of the major themes of the national road safety strategy.

Tasks	Lead Agency Role
7. Encouraging promotion at the local level	• Mobilises local leadership and support to help achieve road safety strategy goals; • Develops and funds targeted community road safety programs and supports local road safety coordinators.

Source: adapted from Bliss and Breen, 2009

4.2.5 Monitoring and evaluation

Monitoring and evaluation deal with the on-going and systematic measurement of road safety performance measures and indicators in order to assess and evaluate the efficacy of introduced measures and interventions. The Country Guidelines have identified thee core tasks in which the lead agency has a dominant role (Table 7).

Table 7: Lead Agency role in monitoring and evaluation

Tasks	Lead Agency role
1. Establishing and supporting data systems to set and monitor final and intermediate outcome and output targets	• Establishes databases to identify and monitor final and intermediate outcomes and outputs; • Establishes and publishes the socio-economic cost of road traffic injuries; • Establishes central computerised transport and driver licensing registries to manage data on the number of vehicles and drivers on the road which are easily accessible for enforcement agencies; • Establishes travel patterns and exposure in the system of different types of road use through periodic national travel surveys (mobility surveys); • Establishes linkages between police reports and hospital admissions data or to assess levels of underreporting; • Establishes linkages between national causes of death statistics to assess and validate traffic fatalities; • Establishes or supports existing safety rating programs on new cars and road networks which provide SPIs; • Conducts before and after studies to establish the effectiveness of specific road safety measures and in-depth studies to ascertain contributory factors, and the causes and consequences of injury; • Establishes or adopts tools for local highway and police authorities to undertake data collection, analysis and monitoring techniques and database management.

2. Transparent review of the national road safety strategy and its performance	• Conducts regular reviews of the progress of the national road safety strategy in achieving results; • Establishes transparent independent peer reviews of road safety management capacity in terms of results, interventions and institutional management functions; • Establishes a road traffic inspectorate to monitor the rate and quality of implementation of its road safety strategy; • Reports road safety results and progress made and make interactive crash data systems available on the Internet.
3. Making any necessary adjustments to achieve the desired results	• Ensures that the results of monitoring and evaluation are presented and discussed at all levels of the road safety strategy coordination hierarchy to improve the focus on achieving results (see Results Focus section).

Source: adapted from Bliss and Breen, 2009

4.2.6 Research and development and technology transfer

This is an integral and essential component of any road safety management system and relates to the timely identification of changes in the system, the development of new techniques and methods, the application of new knowledge and the transfer and application of knowledge to continually improve the efficiency and effectiveness of the system in order to keep meeting the desired results.

In terms of R&D and technology transfer the Country Guidelines identify six primary tasks which the leading agency has a predominant role in and these are listed in Table 8.

Table 8: Lead Agency role in the research and development and technology transfer

Tasks	Lead Agency Role
1. Developing capacity for multi-disciplinary research and knowledge transfer	• Ensures in-house capacity for road safety research and management as well as contracting out to road safety research organisations as road safety activity increases; • Supports and develops key partnerships with independent road safety research organisations for a range of road safety management functions.
2. Creating a national road safety research strategy and annual programme	• Establishes with its partners a national road safety research program to address the needs of the road safety strategy with annual review of needs and consultation with external experts.
3. Securing sources of sustainable funding for road safety research	• Assigns specific annual budgets for road safety research for in-house and external research; • Establishes levies on motor vehicle insurance premiums in support of road safety research; • Encourages business sponsorship for public sector research.

4. Training and professional exchange	• Employs a variety of means for training and knowledge transfer including professional exchange and attendance at road safety courses, seminars and workshops.
5. Establishing good practice guidelines	• Develops in-house or contracts out to research and professional organisations the production and dissemination of good practice guidelines which comprise a synthesis of universal road safety principles in specific areas of road safety, advice on the general means of applying them and illustrative case studies.
6. Setting up demonstration projects	• Develops and funds demonstration projects in areas which offer large potential for road casualty reduction and uses the successful results to roll-out the projects nationally.

Source: adapted from Bliss and Breen, 2009

4.3 Requirements Related to Interventions

Interventions are aimed at the source of the problem and are taken at the level where they occur and serve as the bridge between the management functions and the outcomes. They are directed at addressing problems related to the roads, drivers and vehicles, or managing the outcomes of failures where these occur.

A lead agency has a guiding role in this and although it cannot be held accountable for all interventions and their outcomes (this is the responsibility of the authority in whose jurisdiction the problem is evident), the lead agency has a coordinating role in seeing that interventions are taking at a system level rather than isolated and uncoordinated actions aimed at incidental problems that have little effect on overall outcomes. These interventions are typically system interventions and directed at large scale implementation requiring standardisation and uniformity in approach. This demands a coordinated approach.

Interventions are aimed at three dimensions, as presented in Table 9 and the lead agency has the responsibility of providing the supporting framework necessary for implementing the intervention.

Table 9: Interventions and supporting lead agency functions

Intervention Level or Dimension	Examples of Supporting Road Safety Functions
1. Planning, design, operation and use of road network	• Road network classification (safety) • Blackspot programme • Safe road design manuals • RSIA/NSM/RSI/RSA • Speed management • Pedestrian Management plans

2. Entry and exit of vehicles and road users using the network	• Driver licensing and testing • Vehicle registration and licensing • Vehicle roadworthiness • Vehicle and driver and standards • Traffic offences • Offence monitoring • PT vehicle standards • Commercial vehicles
3. Treatment of crash victims	• Emergency response goals and monitoring • Fleet assessment • Quality reviews emergency and trauma care • Protocols and standards

Source: adapted from Bliss and Breen, 2009

4.3.1 Planning, design, operation and use of the road network

The planning, design, operation and use of the road network (including terminal and other transport facilities) relate to the standards and guidelines that are applied to providing, maintaining, operating and managing the road network. For road safety it is of paramount importance that the network is provided with the necessary safety features to ensure the safety of the users and the safety between users. To facilitate that, the elements of road network design must comply with safety standards, road users must comply with restrictions set to ensure safe operation and engineers must ensure that the roads are maintained at a level that these standards are not compromised.

From a safe systems perspective the following need to be adopted:

- Comprehensive safety standards and rules and performance targets for the planning, design, operation and use of roads;
- Aligning speed limits with safe systems design principles;
- Ensuring that compliance regimes are in place and that users adhere to the safety rules and standards; and
- That safety standards and rules take into account the specific needs of high risk road user groups.

A Safe Systems Approach provides a road environment where roads incorporate concepts such as Self Explaining Roads (SER (Matena et al., 2008)) and Forgiving Roadsides. In other words, roads are designed and constructed in such a manner that the risk of crashes is minimized (i.e. the design of the road will not be directly attributable to a crash) and there where they do occur, the severity of the crash will be minimized. Roads typically have features such as adequate clear zones, no roadside hazards; breakaway constructions, safe barriers, no conflicts between opposing traffic, slow and fast traffic physically separated (in time and/or space), etc.

From an operational perspective, road users are restricted in their use of the network by prohibitions, speed restrictions and other legal frameworks, e.g. controlling drink driving;

driving hours; etc. A key concept in this thinking is the idea of a road network classification whereby speed limits are the logical result of the relationship between the function, form and use of the road. The Dutch Sustainable Safety system (Koornstra et al., 1992; Schermers, 1999; Schermers & Vliet, 2001; Wegman & Aarts, 2006) relies on five principles which have been interpreted in functional requirements for each of the defined road categories (through roads, distributor roads and access roads in rural areas and distributor and access roads in urban areas). Each of these road categories has its own speed regime (120/100; 80 and 60 km/h in rural areas and 50 and 30 km/h in urban areas) which is the logical result of the interaction between the different road users and conflict types that can be expected or that occur. Such a road network incorporates safe design features, network structure and unique elements that make the road types clearly distinguishable to road users; and whereby they know what type of road it is, the speed limit, what interactions to expect and what types of road users and behaviours to expect.

4.3.2 Control over vehicles using the road network

This aspect relates to the conditions under which vehicles can safely make use of the road network. The country is to set safety standards and rules and control these to ensure that vehicles on its roads continually meet these safety standards.

Making certain safety features compulsory to vehicles using the road network, lobbying manufacturers to provide standard safety features, prohibiting certain vehicles, campaigning among potential buyers to buy vehicles with higher safety ratings etc. are all actions that are supportive of the concept of safer vehicles.

The current vehicle quality control system in place provide for annual roadworthiness testing of the commercial classes of vehicles, but other vehicles are only tested for roadworthiness at a change of hands.

4.3.3 Control of road users using the road network

This aspect concerns specifically the conditions which determine how road users can safely move around the road network. Interventions typically set the safety standards and rules and continuing compliance requirements that will ensure the safety of the individual concerned but also that of fellow road users.

4.3.4 Treatment of road crash victims on the road network

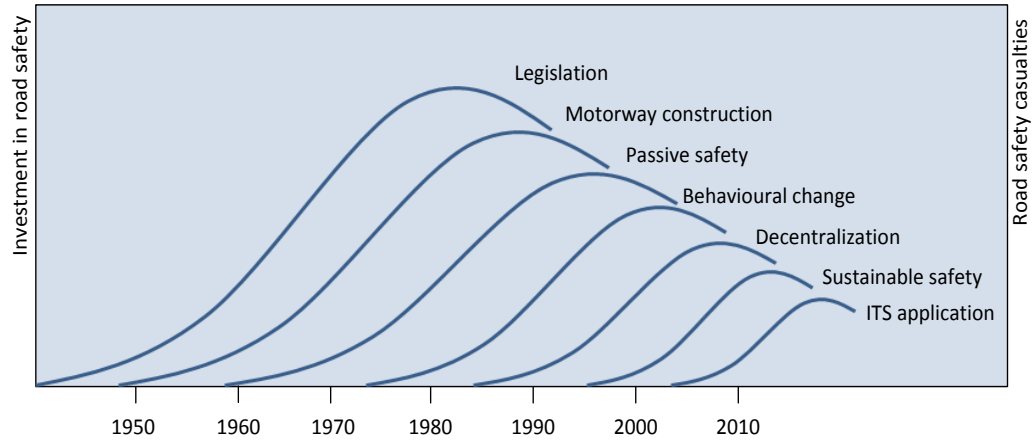
This relates specifically the recovery and treatment of crash victims from the roads after a crash. It concerns fast and efficient emergency response, minimizing travel time to the scene, efficient and correct diagnosis of trauma and stabilization if victims at the scene, fast and efficient transport to a hospital/treatment centre, effective emergency and trauma care and eventual rehabilitation.

5 Road Safety Development Phases

5.1 Typical Road Safety Development Phases

In most countries that practice a Safe Systems Approach to road safety management or where road safety management is traditionally high on the political agenda, i.e. have an active policy for managing road safety effectively, there is a clear relationship between the road safety initiatives and policies and the longer term effects on road safety. Figure 9 gives an example of such policy developments in the Netherlands.

Figure 9: Policy development and investment into road safety improvements



Source: SWOV

Figure 9 illustrates three development phases (establishment, growth and consolidation) and the level of investment required in these phases. Low investment is growing to a peak and tapering off by which stage the next policy has taken up the same cycle. If one considers the right vertical axis to represent the number of road deaths then the effect of an integrated approach to policy development and implementation, backed by sustained investment (left vertical axis), leads to a continual decrease in the number of fatalities and serious injuries. This figure also illustrates that most new policy or technological development and implementation takes time before an effect on road crashes can be established.

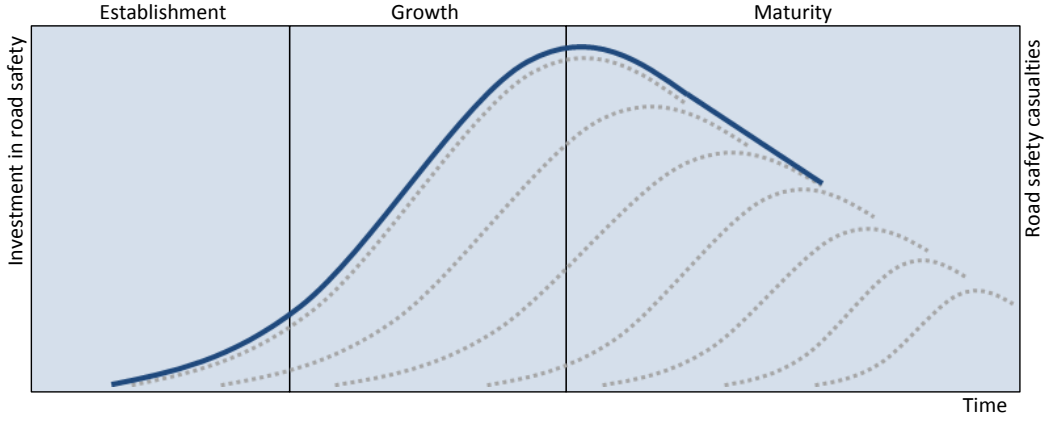
As an example, typically growing motorisation leads to an increased demand for improved road infrastructure. However, this takes time to realise and before that is implemented road crashes can be expected to increase before decreasing. Also important in this is that successful past policies are not totally discarded, they become part of the new initiatives. In this way road safety management evolves toward an integrated approach encompassing road users, roads and vehicles and covering the traditional three E's of engineering, enforcement and education. This progression ultimately led to countries such as the Netherlands and Sweden adopting a holistic approach which encapsulates all past thinking on road safety management into what today is the Safe Systems Approach (avoid crashes and where they cannot be avoided, mitigate the injury effect).

5.2 A Framework of Road Safety Development Phases

The combined effect of the policy development cycles, as presented in Figure 9 can be applied to a general framework of road safety development phases, resulting in three overall phases of road safety development, i.e. establishment, growth and maturity.

In these three overall phases the effects of the individual policy cycles, for example on legislation or motorway construction, are aggregated, resulting in an effect as presented in Figure 10.

Figure 10: Road safety development phases



Source: Ecorys and SWOV

5.3 Typical Road Safety Characteristics Per Road Safety Development Phase

For the three identified road safety development phases typical road safety characterises can be described at the level of the five road safety pillars, as presented in Table 10.

Table 10: Road safety development phases and typical characteristics

Development Phases	Establishment	Growth	Consolidation
Road safety management	• No/limited political will • Limited interaction between stakeholders • Lack of coordination, no integrated approach • Limited funding • Weak legal framework • Limited supporting research • No local research	• Road safety growing concern with political support. • Limited funding • Treatment segregated • Limited coordination • Limited local research • Limited monitoring evaluation • Fair legislative framework	• Well-developed political support • Fair to high degree of integrated coordination • Fair to adequate funding • Supporting legislative regulatory framework • Intergraded action programme • Targeted research

Development Phases	Establishment	Growth	Consolidation
Safer roads and mobility	• Underdeveloped road network • Limited sized network • Poor road conditions • Lack of road standards • Limited capacity in road management • Limited attention for vulnerable road users	• Developing road network • Varying design standards • Fair road maintenance • Limited attention for vulnerable road users • Developing public transportation facilities	• Developed road network • Good public transport facilities • Integrated planning and development • Multimodal systems • Good quality facilities
Safer vehicles	• Low car ownership and low vehicle mileage • Limited vehicle standards • High age of vehicles • Limited roadworthy tests • Weak public transportation	• Growing car ownership • High age of vehicles • Developing public transportation	• Stabilised car ownership • Low age of vehicles • International vehicle standards applied • Standard requirements for new and existing vehicles • Good public transportation
Safer road users	• Low quality drivers • Limited road safety awareness (speeding, helmets, alcohol, seat belts, child restraints) • Limited effective road safety education • Ad hoc enforcement aimed at income generation vs safety	• Growing number of drivers • Low seatbelt rate • Low adherence of traffic laws • Improving critical offence rates • Increased enforcement • Ad hoc education and promotional campaigns	• Good quality drivers • Low infringement rate • Penalty point driver licensing • High and visible enforcement • High compliance rates to critical offences • High awareness of road safety • Well established training and educational programs • Strict control for licensing
Post-crash response	• Limited number of ambulances • Limited trauma centres	• Ambulances and trauma centres in major urban areas	• Adequate number of trauma centres and personnel • High quality protocols

Development Phases	Establishment	Growth	Consolidation
	• No protocols on road crashes	• Reasonable levels of training • Protocols available	• Performance monitoring and evaluation of targets
Road safety data	• Low quality crash data • No crash management system • Poor registration and reporting • Inadequate system protocols • Poor control checks and balances • Limited exposure data • Poor location data	• Poor to reasonable quality crash data • Limited controls and verification • Locations generally known • Limited critical offence and enforcement data	• Moderate to high quality crash data • Exposure data widely available • Location specific • Enforcement data available • Critical offences data available

Source: Ecorys and SWOV

5.4 Typical Policy Measures Per Road Safety Development Phase

The framework of road safety development phases indicates that characteristics and typical problems differ per road safety development phase. Consequently, the measures and tasks that are needed to improve road safety also differ per road safety development phase. As an example, a country that is in the establishment phase is often phased with an inadequate legal framework and an underdeveloped road network, resulting in a need for measures aimed at creating a solid legal framework and at developing basic infrastructure, with attention for vulnerable road users. In countries that have entered into the growth or maturity phase, needs have changes and so have the consequent measures. Table 11 presents examples of typical measures and tasks per development phase.

Table 11: Typical measures and tasks per road safety development phase

Development Phases	Establishment	Growth	Consolidation
Road safety management	• Garner political support for road safety • Improvement of poor to medium quality road safety information systems • Development of co-ordination structures	• Foster relationships to maintain political support for road safety • Development of medium to high quality management information system • Coordination of central levels	• Maintaining high quality road safety management information systems • Appraising current road safety performance through high level strategic review • Adopting a far reaching road safety

	• Assigning lead agency responsible for road safety management • Development of coordination structures • Development of policy review procedures • Setting of short term targets and long term initiatives • Develop and maintain specific delivery partnerships between government, NGO, community and business at the central, regional and local levels	• Adopting short to medium term road safety targets • Analysing what can be achieve in the medium term • Develop and maintain specific delivery partnerships between government, NGO, community and business at the central, regional and local levels	vision for the longer term • Setting quantitative targets by mutual consent • Establishing mechanisms to ensure partner and stakeholder accountability for results • Horizontal and vertical coordination across all government level • Develop and maintain specific delivery partnerships between government, NGO, community and business at the central, regional and local levels • Parliamentary relations at central, regional and local levels • Establish transparent independent peer reviews of road safety management capacity in terms of results, interventions and institutional management functions; • Establish a road traffic inspectorate to monitor the rate and quality of implementation of its road safety strategy

Safer roads and mobility	• Develop Road network categorisation plans • Develop appropriate functional and operational characteristics for road types • Setting of appropriate speed limits • Encourages PT use • Develops strategies and plans for vulnerable road users • Secures funding for development projects	• Implements large scale remedial road improvement projects • Implements strategic road network development plans • Implements large scale improvement projects for vulnerable road users • Adopts an integrated approach to road infrastructure planning and provision • Adopts a Safe Systems Approach to road design	• Maintains road network standards • Continual improvement and review of road design standards and approaches • Conducts road safety audits, Road safety inspections and reviews network safety management • Develops and funds demonstration projects in areas which offer large potential for road casualty reduction and uses the successful results to roll-out the projects nationally
Safer vehicles	• Establish vehicle registration registers • Develop minimum standards for entry of vehicles on public roads • Develop roadworthiness criteria and monitoring systems • Develop enforcement strategies • Set standards and regulations regarding the use of vehicles	• Maintain and improve vehicle registration and licensing • Vehicle roadworthiness • Vehicle standards • Traffic offence monitoring of roadworthiness • Public transportation vehicle standards • Commercial vehicle standards	• Set safety standards and rules and legislate the use of vehicles on public roads • Enforce and control standards continually • Make certain safety features compulsory to vehicles using the road network • Lobby manufacturers to provide standard safety features • prohibit certain vehicles • Campaigning among potential buyers to buy vehicles with higher safety ratings etc.

			• Establish or supports existing safety rating programs on new cars and road networks which provide road safety indicators
Safer road users	• Set the safety standards and rules and continuing compliance requirements that will ensure the safety of the individual concerned but also that of fellow road users • Develop standards for driver licensing, testing and appraisal • Driver offences monitoring • Develop and implement educational programmes for school children • Develop strategies to improve safety of vulnerable road users	• Review and set the safety standards and rules for continuing road user compliance • Driver licensing and testing • Offences monitoring • Targeted law enforcement and critical driver offences monitor • Informed educational and publicity campaigns for improved road user behaviours • Securing legislative resources for road safety	• Nurture and support a road user behaviour culture based on compliance • Set the safety standards and rules and continuing compliance requirements that will ensure the safety of the individual concerned but also that of fellow road users • Reviewing the scope of the legislative framework • Developing and updating legislation needed for the road safety strategy • Consolidating legislation • Employs a variety of means for training and knowledge transfer • Development and dissemination of good practice guidelines
Post-crash response	• Review the capabilities and capacity of trauma response units • Establish key performance data and set targets	• Emergency response goals and monitoring • Fleet assessment • Quality reviews emergency and trauma care • Protocols and standards	• Maintain and improve fast and efficient emergency response • minimizing travel ti**m**e to the scene, • Improve efficient and correct diagnosis

	• Develop monitoring systems • Implement regional pilot projects • Develop strategies to improve capacity and resource allocation for trauma response and management	• Funding for emergency and trauma care	of trauma and stabilization • Fast and efficient transport to a hospital/treatment centre, • Maintain and improve effective emergency and trauma care and eventual rehabilitation
Road safety data	• Establish central computerised transport and driver licensing registries to manage data on the number of vehicles and drivers on the road which are easily accessible for enforcement agencies; • Establish a reliable crash reporting and recording system • Develop programmes to obtain supplementary data for road safety management (traffic volumes; speeds; etc.)	• Evaluate and improve crash registrations • Develop supportive road safety indicators • Establish central computerised transport and driver licensing registries to manage data on the number of vehicles and drivers on the road which are easily accessible for enforcement agencies • Establish linkages between national causes of death statistics to assess and validate fatalities; • Establish or adopt tools for local highway and police authorities to undertake data collection, analysis and monitoring techniques and database management • Report road safety results and progress made and make interactive crash data systems available on the Internet	• Establish databases to identify and monitor final outcomes and road safety indicators and their outputs; • Establish and publishes the socio-economic cost of road traffic injuries; • Establish travel patterns and exposure in the system of different types of road use through periodic national travel (mobility) surveys; • Establish linkages between police reports and hospital admissions data or to assess levels of underreporting; • Conduct before and after studies to establish the effectiveness of specific road safety measures ;

Source: SWOV

Countries can be placed in the framework of road safety development phases, based on their road safety characteristics. Typical road safety measures that are linked to the specific road safety development phase, as identified in Table 10, can then be considered. A next step would be to tailor these measures to the situation and specific needs of the country. The phased development also allows countries to look beyond today's needs and anticipate on what comes next and prepare for future road safety measures.

Section 2: ROAD SAFETY IN OIC MEMBER COUNTRIES

6 Road Safety Performance of OIC Member Countries

This chapter presents the road safety performance of OIC member countries. The performance is presented at an individual country level and as a comparison between countries, both at OIC level and non-OIC level. This is a complex subject, as the performance on road safety in a country depends on many factors, such as motor vehicle fleet size, types of vehicles and quality and design of roads. Also, income level is relevant, as low income countries may face a rapid increase of motorisation, whereas high income countries can invest in safe infrastructure (Kopits & Cropper, 2005).

6.1 General Information on OIC Member Countries

6.1.1 The OIC Member Countries

The OIC has 57 member countries, as presented in Table 12. This review includes all OIC member countries for which data were reported in the latest WHO report (WHO, 2015b).

Table 12: OIC Member Countries

Countries	Abbr.	Countries	Abbr.	Countries	Abbr.
Afghanistan	AFG	Guyana	GUY	Pakistan	PAK
Albania	ALB	Indonesia	IDN	Palestine	
Algeria	DZA	Iran	IRN	Qatar	QAT
Azerbaijan	AZE	Iraq	IRQ	Saudi Arabia	SAU
Bahrain	BHR	Jordan	JOR	Senegal	SEN
Bangladesh	BGD	Kazakhstan	KAZ	Sierra Leone	SLE
Benin	BEN	Kuwait	KWT	Somalia	SOM
Brunei Darussalam		Kyrgyz Republic	KGZ	Sudan	SDN
Burkina Faso	BFA	Lebanon	LBN	Suriname	SUR
Cameroon	CMR	Libya	LBY	Syrian	
Chad	TCD	Malaysia	MYS	Tajikistan	TJK
Comoros		Maldives	MDV	Togo	TGO
Cote d'Ivoire	CIV	Mali	MLI	Tunisia	TUN
Djibouti	DJI	Mauritania	MRT	Turkey	TUR
Egypt	EGY	Morocco	MAR	Turkmenistan	TKM
Gabon	GAB	Mozambique	MOZ	Uganda	UGA
Gambia, The	GMB	Niger	NER	United Arab Emirates	ARE
Guinea	GIN	Nigeria	NGA	Uzbekistan	UZB
Guinea-Bissau	GNB	Oman	OMN	Yemen	YEM

Note: for four countries there are no abbreviations used; for these countries there is also no data available.

6.1.2 Key characteristics of OIC member countries per region

Table 13 to Table 15 provide some general transport and related statistics for countries in each of the three OIC regions; i.e. the African, Arab and Asian region.

African Region

For the African region these statistics reveal that vehicle ownership rates in OIC countries is generally very low (below 50 vehicles/1,000 population) whereas the traffic mortality rates (number of fatalities per 100,000 population) is relatively high (around 25 traffic deaths/100,000 population) when compared to for example western countries. Developed (mostly high income) western countries typically have vehicle ownership rates above 500 vehicles/1,000 population and traffic mortality rates below 10 deaths/100,000 population (many countries with rates in the region of 3-6 per 100,000). However, the car ownership and mortality rates of OIC countries in Africa do not appear to differ markedly from non-OIC countries on the continent. The average vehicle ownership of OIC countries is 33 per 1000 population whereas the average for all countries on the continent is 25 per 1000 (World Bank, 2013; 2014). However, given the low vehicle ownership rates, mortality values are high and suggest that many traffic victims are vulnerable road users (including moped riders and cyclists). All OIC countries in the African region fall into the low to middle income categories, which could explain the relatively low vehicle ownership rates.

Table 13: Key statistics of OIC countries in the African region

Country	Population [million]	Vehicle ownership (v./1,000 p.)	pcGNI [US$]	Income group	Estimated road deaths	Mortality rate [deaths/100,000 population]
Niger	17.8	18	400	Low	4,706	26.4
Guinea	11.7	3	460	Low	3,211	27.3
Gambia	1.8	29	500	Low	544	29.4
Togo	6.8	9	530	Low	2,123	31.1
Uganda	37.6	33	550	Low	10,280	27.4
Guinea-Bissau	1.7	37	590	Low	468	27.5
Mozambique	25.8	21	610	Low	8,173	31.7
Sierra Leone	6.1	11	660	Low	1,661	27.2
Burkina Faso	16.9	91	670	Low	5,072	30.0
Mali	15.3	19	670	Low	3,920	25.6
Benin	10.3	3	790	Low	2,855	27.7
Chad	12.8	49	1,020	Low	3,089	24.1
Senegal	14.1	28	1,050	Middle	3,844	27.2
Cameroon	22.3		1,290	Middle	6,136	27.6
Ivory Coast	20.3	29	1,450	Middle	4,924	24.2
Nigeria	173.6	33	2,710	Middle	35,641	20.5
Gabon	1.7	117	10,650	Middle	383	22.9
Total	**396,6**				**97,030**	
Weighted Avg.		**30**	**1,598.64**			**24. 5**

Source: WHO (WHO, 2015b)
Note: Weighted averages based on population data

Arab Region

OIC countries in the Arab region are all middle to high income countries and vehicle ownership rates are also markedly higher than OIC countries in the African region. However, on average the mortality rates are only marginally lower than the African countries, but significantly higher than those in high income countries in for example Europe. The mortality rates in some OIC countries in the Arab region are significantly lower (e.g. Bahrain, Egypt and the United Arab Emirates) than others. With the exception of Egypt, vehicle ownership rates in these countries also tend to be higher implying that the supporting road infrastructure is of a better quality resulting in fewer fatalities, also among vulnerable road users. Amongst the Arab countries, Libya shows an extremely high mortality rate and this data should be treated with some caution. If these data are correct, Libya's road safety situation deserves special attention.

Table 14: Key statistics of OIC countries in the Arab region

Country	Population [million]	Vehicle ownership (v./1,000 p.)	pcGNI [US$]	Income group	Estimated road deaths	Mortality rate [deaths/100,000 population]
Djibouti	.9		1,030	Middle	216	24.7
Mauritania	3.9	107	1,060	Middle	952	24.5
Yemen	24.4	49	1,330	Middle	5,248	21.5
Sudan	38.	8	1,550	Middle	9,221	24.3
Morocco	33.	100	3,020	Middle	6,870	20.8
Egypt	82.1	86	3,140	Middle	10,466	12.8
Tunisia	11.	158	4,200	Middle	2,679	24.4
Jordan	7.3	174	4,950	Middle	1,913	26.3
Algeria	39.2	186	5,330	Middle	9,337	23.8
Iraq	33.8	134	6,720	Middle	6,826	20.2
Lebanon	4.8	348	9,870	Middle	1,088	22.6
Libya	6.2	573	12,930	Middle	4,554	73.4
Bahrain	1.3	409	19,700	High	107	8.0
Oman	3.6	298	25,150	High	924	25.4
Saudi Arabia	28.8	229	26,260	High	7,898	27.4
UAE	9.3	286	38,360	High	1,021	10.9
Kuwait	3.4	547	45,130	High	629	18.7
Qatar	2.2	299	86,790	High	330	15.2
Palestine						
Somalia	10.5	6		Low	2,664	25.4
Syria						
Comoros						
Total	**343,7**				**72,943**	
Weighted Avg.		**134**	**7,778.24**			**21.2**

Source: WHO (WHO, 2015b)
Note: Weighted averages based on population data

Asian Region

OIC countries in the Asian region (including Albania in Europe and Suriname and Guyana in South America) generally fall into the low to middle income countries. However, it is noticeable that the mortality rates are on average the lowest in this OIC region; this despite vehicle ownership levels similar to countries in the Arab region and much higher than in the African region.

Table 15: Key statistics of OIC countries in the Asian region

Country	Population [million]	Vehicle ownership (v./1,000 p.)	pcGNI [US$]	Income group	Estimated road deaths	Mortality rate [deaths/100,000 population]
Djibouti	.9		1,030	Middle	216	24.7
Afghanistan	30.6	21	690	Low	4,734	15.5
Tajikistan	8.2	50	990	Low	1,543	18.8
Bangladesh	156.6	13	1,010	Low	21,316	13.6
Kyrgyz Republic	5.5	173	1,210	Middle	1,220	22.0
Pakistan	182.1	50	1,360	Middle	25,781	14.2
Uzbekistan	28.9		1,880	Middle	3,240	11.2
Indonesia	249.9	417	3,580	Middle	38,279	15.3
Maldives	.3	178	5,600	Middle	12	3.5
Iran	77.4	347	5,780	Middle	24,896	32.2
Turkmenistan	5.2	162	6,880	Middle	914	17.4
Azerbaijan	9.4	121	7,350	Middle	943	10.0
Malaysia	29.7	802	10,430	Middle	7,129	24.0
Turkey	74.9	239	10,970	Middle	6,687	8.9
Kazakhstan	16.4	239	11,550	Middle	3,983	24.2
Brunei	.					
Europe and South America						
Albania	3.2	141	4,710	Middle	478	15.1
Guyana	.8	20	3,750	Middle	138	17.3
Suriname	.5	384	9,370	Middle	103	19.1
Total	**879,6**				**141,396**	
Weighted Avg.		**226**	**3,710.88**			**16.1**

Source: WHO (WHO, 2015b)
Note: Weighted averages based on population data

6.2 Methodology for Assessing Road Safety Performance

In order to make a road safety comparison between countries of the world, reliable data of the number of killed or (seriously) injured are required. Furthermore, for a sound analysis of actual safety levels, data of travel behaviour are needed. Additional information, such as information describing political and social stability and the health situation in a country, can further help to understand differences.

The WHO reports contains some of this data for most countries (World Health Organisation, 2015b). However, reported road death numbers are often estimated, and data relating to travel behaviour (by travel mode), fleet size (by travel mode) or road length data (by type of road) are not always available.

Across the world, more than 200 countries differ widely in terms of population, population density, geophysical nature, wealth, political stability etc. These factors all influence road safety management and the ability to improve road safety. To account for some of these differences, a common unit to measure road safety is *risk*, which relates to the number of deaths to distance travelled, expressed in km. However, traffic data such as these are often not available and therefore a more common unit for expressing road safety risk is *mortality*. This relates the number of road deaths to population size, i.e. we use mortality rates, expressed as per million, i.e. road deaths per million inhabitants.

It was recently shown that the value of a statistical life increases considerably with increasing per capita Gross National Income (pcGNI) (Wijnen & Stipdonk, 2016). This suggests that high income countries are willing to invest a higher proportion of Gross National Income (GNI) in a safe traffic system than low or middle income countries. GNI may therefore be a simple variable that may explain differences in mortality. Since GNI is related to population, it is expressed as and average per capita GNI (or pcGNI) i.e. average GNI per inhabitant, expressed in US$.

In this report the 2013 road mortality and pcGNI for different OIC member countries and other countries are analysed. The analysis is based on World Health Organisation data (World Health Organisation, 2015). Although the WHO data is reasonably complete, there are four OIC member countries for which no data were available. These are Brunei, Comoros, Palestine and the Syrian Arabic Republic. These countries have been left out of the analysis. In addition to 53 OIC member countries, 126 non-OIC countries have been included in the analysis.

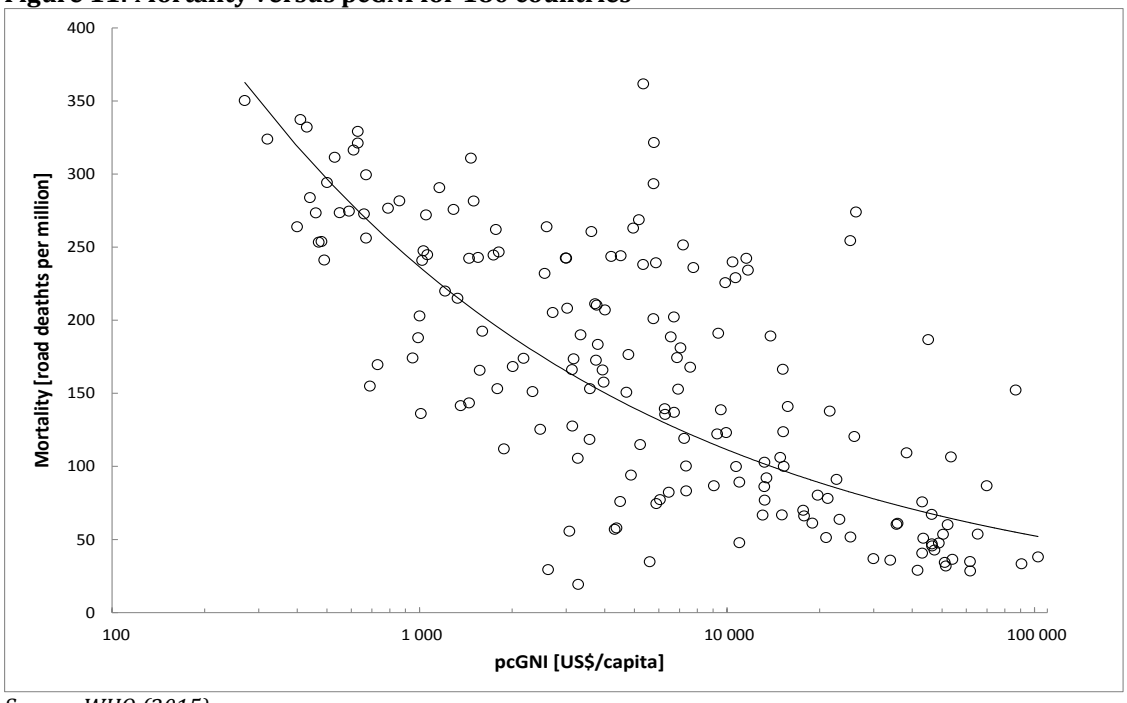
The selected countries have been stratified into the three income levels defined by the WHO, namely high income countries (pcGNI>12,745 US$), middle income countries (1,046<pcGNI<12,745 US$) and low income countries (pcGNI<1,046 US$).

6.3 Results in Terms of Road Safety Performance

6.3.1 Mortality rates by income levels

As a first reference the mortality and income (as expressed by pcGNI) data for all countries for which WHO had data available (126 non-Islamic countries and 57 Islamic countries) were plotted (Figure 11). Mortalities range typically between approximately 40 per million to 400 fatalities per million inhabitants, which can easily be plotted with a straightforward linear scale. However, pcGNI's can differ more than two orders of magnitude: from less than 300 US$ to more than 100,000 US$. The country with the highest pcGNI, Monaco, was left out of the analysis as there were no fatalities reported in in Monaco in 2013 and also because it is a very small country. Libya is not in this graph since it has an extremely high reported mortality rate of 783 fatalities per million inhabitants.

Figure 11: Mortality versus pcGNI for 180 countries



Source: WHO (2015)
Note: The line represents an unweighted best fit of a power function; its formula is mortality = 2259 (pcGNI) -0.327. To make the results easier to observe, the horizontal axis is represented on a logarithmic scale.

The global relation between pcGNI and mortality as shown in Figure 11 suggests that high income correlates with high road safety levels. This seems logical, since high income is generally indicative of a well-developed public transport system, high car ownership (as opposed to powered two wheeler use) and long term investments in safe infrastructure, such as safe highways.

The fitted regression line drawn in Figure 11 merely serves to indicate a general trend in the data. Individual values for each country were not weighted by population to estimate this line and each data point in the graph weighs equally. The large spread above and below this line shows that, although high income helps to achieve better road safety, countries with roughly the same income levels can still differ in mortality by a factor of three or more. There could be various explanations for these differences, the most obvious being differences in traffic volumes and distances travelled by vehicles and/or passengers. Other examples of factors which could explain these differences could be geological differences (i.e. flat countries versus mountainous countries) or weather conditions (e.g. long wet seasons) or differences in road user behaviour. A low mortality in low income countries may indicate a low level of motorisation. This could imply that increased levels of motorisation (vehicle ownership) may lead to increased mortality.

Given the scope of this study, these factors cannot be investigated in detail. However, it is worth mentioning one factor that could possibly explain differences in road safety rates (or, for that

matter, health related factors in general), namely the GINI coefficient, which is defined (United Nations Development Programme, 2015) as:

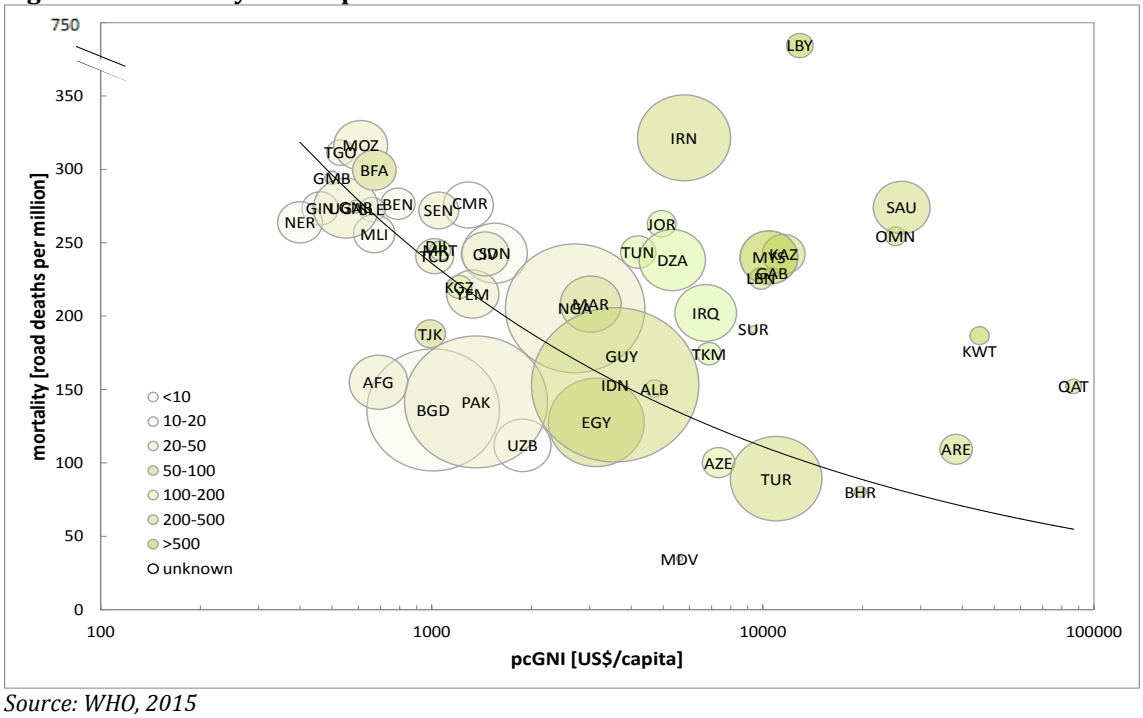
"Measure of the deviation of the distribution of income among individuals or households within a country from a perfectly equal distribution. A value of 0 represents absolute equality, a value of 100 absolute inequality".

The GINI coefficient is used to measure inequality in income distributions. In countries with high GINI values the majority of the income is earned by a small proportion of the population whereas in countries with low GINI indices the income earned is distributed more evenly across the entire population.

6.3.2 Mortality rates by income levels, population and vehicle ownership in OIC member countries

Assuming that the regression line from Figure 11 represents a meaningful average relationship between mortality and income levels (pcGNI), Figure 12 shows the distribution of the data of the OIC member countries around this average. In order to provide insight into population size and vehicle ownership, the data points in the graph are represented by circles, the area of which describes the size of population of each country and the colour shade the level of vehicle ownership (darker representing higher ownership). It should be noted that vehicle ownership is also based on WHO data and these include motorised two-wheelers.

Figure 12: Mortality versus pcGNI for OIC member countries



Source: WHO, 2015
Note: The line represents an unweighted best fit of a power function to the data as shown in Figure 5.1. To make the results easier to observe, the horizontal axis is represented on a logarithmic scale.

An interesting, and somewhat surprising result from this graph is the relatively high mortality rate of five of the six high income (>12 756 US$) OIC member countries. The United Arabic Emirates (ARE), Qatar (QAT), Kuwait (KWT), Oman (OMN) and Saudi Arabia (SAU) all have mortality rates that are significantly higher than what would be expected in high income countries internationally. Amongst the high income countries, only Bahrain (BHR) has a mortality rate marginally below the expected norm. Turkey (TUR) just falls outside the definition of high income countries but also has a lower mortality rate than expected. Since these data do not take into account important factors, such as the degree of motorisation and amount of travel, the results must be viewed with some caution. Although it is generally accepted that most high income countries are highly developed with a high degree of motorisation, this is not always the case. Countries such as Bahrain may be defined as high income, but are yet to experience associated growth in motorisation and transport infrastructure development.

This analysis reveals that Saudi Arabia is a particularly interesting case with a mortality rate about three times higher than the international norm. A possible explanation may be found in the GINI index. A high GINI coefficient indicates an unevenly distributed income. The GINI indexes are published by the World Bank (World Bank, 2013), but are unfortunately not available for all countries and these include Saudi Arabia, Bahrain, United Arabic Emirates, Kuwait and Oman. Qatar, which is also a high income country with a somewhat higher than expected traffic mortality rate, has a GINI coefficient of 41.1%, which is not extraordinary high but 1,5 times higher than developed countries, such as Norway and the Netherlands.

Amongst the middle income countries (between 1,046 US$ and 12,745 US$ per capita), Libya (LBY) and Iran (IRN) have remarkably high road mortality rates. As mentioned earlier the data for Libya reveal extremely high traffic mortality rates and should be treated with caution. In Libya the traffic mortality rate is around seven times higher than what would normally be expected from an average middle income country. The road mortality (743 per million) is more than twice the value of the next high mortality country, which is Iran. In Iran, the mortality rate is half of Libya's and double that what is expected from a country with its pcGNI. The chance of an average Iranian being killed in a traffic related incident is therefore significantly higher than in most other middle income countries.

A third relevant group is the group of middle income countries and high population with a relatively high mortality, i.e. Iran (IRN), Nigeria (NIG), Morocco (MAR), Algeria (DZA), Gabon (GAB), Lebanon (LBN), Kazakhstan (KAZ), Malaysia (MYS), Turkmenistan (TKM), Iraq (IRQ), Suriname (SUR), Tunisia (TUN) and Jordan (JOR). The mortality rate in these countries may well be affected by factors, such as increased motorisation, urbanisation and demand for travel.

Most of the remaining middle income countries have a somewhat lower road mortality rate. In these cases this could be explained by lower levels of motorisation. Increased affluence may result in increased demand for travel and rising car ownership which could negatively impact the mortality rates in countries such as Afghanistan (AFG), Bangladesh (BGD) and Pakistan (PAK).

A next group is formed by most of the remaining low income countries, that almost all have a high road mortality. For these countries, road mortality is not notably higher than the average for all countries. Notwithstanding this, their mortality is high and this may offer opportunities to improve safety.

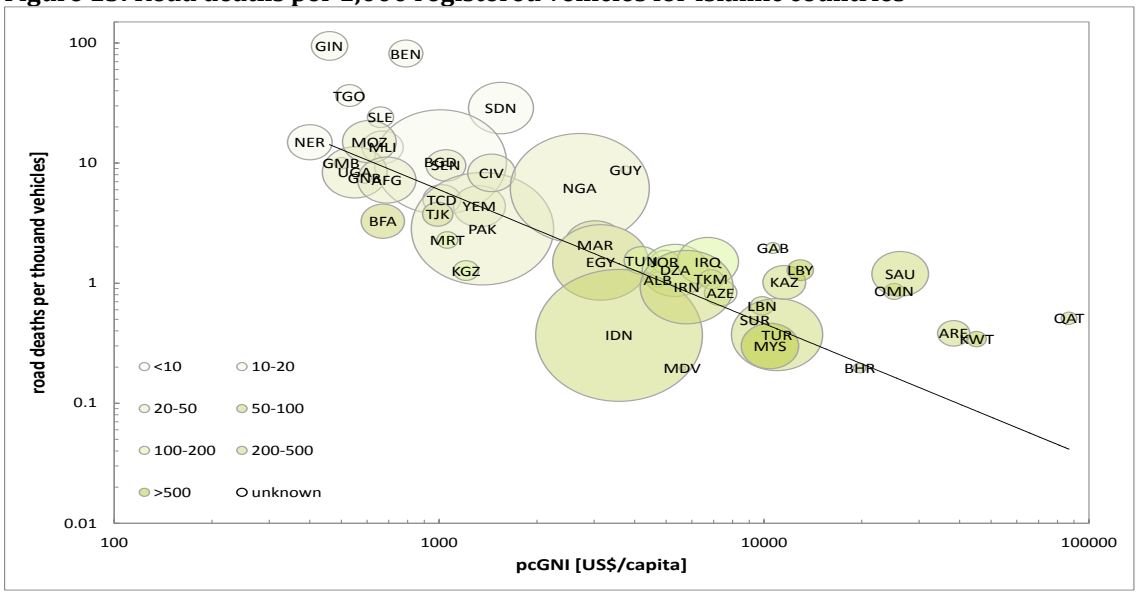
6.3.3 Fatality rates by vehicle population, income level and population in OIC member countries

Figure 13 shows the relationship between road deaths as a function of the vehicle population to income levels, vehicle ownership and population. The line in the graph represents the trend in the average number of road deaths per 1,000 registered vehicles in 150 countries available in the WHO report. The graph shows that, again, five out of six high income OIC member countries have a moderately to highly enhanced risk as compared to this average, whereas most other countries show a more or less equivalent number of road deaths per vehicle as compared to the average.

From left to right the pcGNI increases, and from the colours used to represent fleet density (vehicles per thousand inhabitants) we see that, not surprisingly, this fleet density also increases with pcGNI. From this graph, the high mortality as shown in Figure 13 for Libya and Iran can be understood from the high fleet density (shown as a darker colour green).

Countries to the upper left of the graph show a very high number of road fatalities per vehicle, indicating a very poor road safety level in general. Especially countries appearing above the average line can be expected to have extremely unsafe roads.

Figure 13: Road deaths per 1,000 registered vehicles for Islamic countries



Note: The line represents the average for all countries with data available. It is a power law, with y = x-1.115. Colours correspond to intervals of vehicles per 1000 inhabitants. The size of each circle is proportional to the population of each country. For both axes, a logarithmic scale is used because of the large spread in values for both pcGNI and road deaths per vehicle.

The group of OIC member countries can be stratified into four groups that potentially could require different approaches to improve road safety:

1. High Income countries (HICs) with a much higher road mortality than average for HICs in general.
2. Middle Income countries (MICs) with a higher than average road mortality.
3. MICs with a lower than average road mortality.
4. Low Income countries (LICs) with a mortality that is high in an absolute sense.

Conclusions will be further elaborated in Chapter 12.

7 Desk Research Results on Road Safety Management and Data

7.1 General Overview of Road Safety Development in OIC Member Countries

This section provides an overview of the development of the Safe Systems Approach in the OIC member countries, grouped according to their regions. To this end a rating system has been developed, providing insight in the way OIC member countries manage the five road safety pillars and related road safety data. In order to be as objective as possible, the majority of ratings are derived from scores presented in the WHO World Report (World Health Organisation, 2015). The way the scoring system is designed is presented in Appendix 3.

In certain cases no data were available and these have not been rated (indicated by N/A). The scores are based on best current insights and should be viewed as indicative rather than certain. The WHO World Report is based on a limited number of criteria that do not reveal the full depth of road safety management although they are the best currently available for an international comparison. To establish insight in how far countries are adopting the Safe Systems principles would require a full capacity review, covering the full spectrum of management functions, interventions and results (based on the World Bank and WHO guidelines of Bliss and Breen, see chapter 3 and 4). In most cases such capacity reviews have not been conducted or were not available for this literature study. The WHO study provides a uniform and standardised set of data with which an initial comparison could be done.

Table 16 to Table 18 provide insight into the scores per pillar and per OIC member country. The scores are the result of a weighting applied to the different criteria, as described in the Global Plan developed for the UN (United Nations, 2011). In addition, the component of road safety data was added to the overall evaluation. This last element was added as a separate criterion since the road safety management pillar only reflects this indirectly and road safety data is a very important outcome indicator and paramount for effective road safety management.

African Region

In the Africa region (Table 16), Burkina Faso, Gabon, Gambia and Togo are as yet to initiate steps to adopt a Safe Systems Approach to road safety management. There are no OIC member countries in the Africa region practising state of the art Safety Management practices and neither are there any countries in this region that rate highly across all the pillars.

Table 16: Rating of OIC countries in the Africa region

African Group	WHO data	Safety Mngt (Inst. Fmwk)	Roads and Mobility	Vehicles	Road Users	Post-Crash Care	Road Safety Data
Benin	✓	4	4	2	1	2	2
Burkina Faso	✓	4	1	1	1	2	1
Cameroon	✓	4	2	N/A	1	3	1
Chad	✓	4	3	N/A	1	2	1
Cote d'Ivoire	✓	4	2	2	2	3	1
Gabon	✓	2	1	N/A	2	2	1
Gambia	✓	1	1	2	1	3	1
Guinea	✓	3	2	2	1	2	1
Guinea-Bissau	✓	2	2	2	1	4	1
Mali	✓	4	3	2	2	3	2
Mozambique	✓	3	1	2	3	2	1
Niger	✓	3	2	2	1	3	2
Nigeria	✓	4	5	2	3	2	1
Senegal	✓	4	2	2	1	2	1
Sierra Leone	✓	3	1	2	5	3	1
Togo	✓	1	2	1	2	2	1
Uganda	✓	2	4	N/A	1	3	2

Note: A weighting was applied to the WHO data to derive the above summary scores in each pillar. These are based on the number of Yes/No responses per Pillar; the proportion of 2-wheeled vehicles in the population, the number of traffic laws applied etc. as shown in Appendix 3. A score of 1 is poor and 5 is excellent.

Arab Region

In the Arab region (Table 17) Djibouti, Lebanon, Somalia and Yemen consistently score low across all pillars and aspects. Kuwait, Oman and Qatar score high on the Pillar Road Safety Management but lower on most other aspects. The United Arab Emirates appears to be the closest to applying the principles of the Safe Systems Approach. However, even though these last mentioned countries, which are graded as high income countries, appear to practice good safety management, they still have mortality rates far exceeding that of other high income high countries and even that of many medium and low income countries (See chapter 5). Given that some of these countries have experienced moderate to high economic growth in the past 20 years, paired with growing vehicle ownership and resulting in significant investment in road infrastructure, it is expected that road crashes will increase in the coming years unless these countries invest in the other pillars supporting the Safe Systems philosophy. Similar trends to this were witnessed in Europe where traffic fatalities peaked at about the same time major investments were made in road infrastructure improvements and supporting road safety policies.

Table 17: Rating of OIC countries in the Arab region

Arab Group	WHO data	Safety Mngt (Inst. Fmwk)	Roads and Mobility	Vehicles	Road Users	Post-Crash Care	Road Safety Data
Algeria	✓	4	3	2	4	2	1
Bahrain	✓	3	3	2	3	2	4
Comoros	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Djibouti	✓	1	1	2	2	1	1
Egypt	✓	3	2	5	4	3	2
Iraq	✓	2	3	N/A	1	3	3
Jordan	✓	3	3	N/A	2	3	2
Kuwait	✓	5	3	2	2	2	1
Lebanon	✓	1	2	2	3	3	1
Libya	✓	3	2	2	1	2	2
Mauritania	✓	4	3	N/A	1	2	1
Morocco	✓	4	5	2	4	2	2
Oman	✓	5	5	2	4	3	4
Palestine	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Qatar	✓	5	5	2	2	3	1
Saudi Arabia	✓	4	4	N/A	1	3	3
Somalia	✓	2	1	2	1	2	1
Sudan	✓	3	2	2	2	2	1
Syria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tunisia	✓	3	1	2	3	2	2
UAE	✓	4	5	2	4	3	2
Yemen	✓	1	3	2	1	3	1

Note: A weighting was applied to the WHO data to derive the above summary scores in each pillar. These are based on the number of Yes/No responses per Pillar; the proportion of 2-wheeled vehicles in the population, the number of traffic laws applied etc. as shown in Appendix 3. A score of 1 is poor and 5 is excellent.

Asian Region

In the Asian region (Table 18) Afghanistan, Maldives and Pakistan rank poorly with regards to adopting measures supporting the pillars adopted by the Global Plan for the Decade of Action. Indonesia, and to a lesser extent Malaysia, have instituted strong safety management initiatives although they still score quite poorly in the other pillars. In the Asian group Kazakhstan appears to be the most advanced in terms of meeting the criteria encompassing a Safe Systems Approach.

Table 18: Rating of OIC countries in the Asian region

Asian Group	WHO data	Safety Mngt (Inst. Fmwk)	Roads and Mobility	Vehicles	Road Users	Post-Crash Care	Road Safety Data
Afghanistan	✓	2	1	2	1	2	1
Albania	✓	4	5	2	3	3	2
Azerbaijan	✓	2	2	2	3	4	3
Bangladesh	✓	3	3	1	1	1	2
Brunei	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indonesia	✓	5	5	1	2	2	2
Iran	✓	3	4	2	4	4	2
Kazakhstan	✓	5	4	2	5	4	4
Kyrgyz Republic	✓	4	3	2	3	3	4
Malaysia	✓	5	5	3	2	2	4
Maldives	✓	1	1	1	1	3	4
Pakistan	✓	1	2	1	2	2	1
Tajikistan	✓	3	3	2	4	3	2
Turkey	✓	4	4	5	3	3	2
Turkmenistan	✓	4	5	2	5	1	3
Uzbekistan	✓	3	2	N/A	4	3	1
Guyana	✓	4	1	2	1	3	4
Suriname	✓	2	4	2	5	2	2

Note: A weighting was applied to the WHO data to derive the above summary scores in each pillar. These are based on the number of Yes/No responses per Pillar; the proportion of 2-wheeled vehicles in the population, the number of traffic laws applied etc. as shown in Appendix 3. A score of 1 is poor and 5 is excellent.

Comments based on the scores

This analysis reveals that there are no OIC member countries that score high on all elements. This is in itself not surprising because even countries such as Sweden and the Netherlands, which have been applying the Safe Systems Approach, do not systematically score high across all the elements (Bliss & Breen, 2009; Morsink et al., 2005). However, a bigger concern is the countries which score low across all pillars and countries which score high on Safety Management and low on most of the other aspects. The fact that these countries score high on road safety management and low on other aspects could mean that the effect of state of the art road safety management infrastructure and systems as yet has to manifest itself. However, it could also mean that a lead agency has been put into place but that this agency has been unable to systematically deal with problems in the other pillars. To gain insight into the effectiveness of the road safety management one would need historical data to follow developments in the other pillars. As has been suggested earlier, capacity reviews are a useful instrument to gain the

required insight into road safety management and it is strongly advocated to undertake such reviews in OIC member countries.

The fact that some OIC member countries score relatively high across all pillars but yet have high crash rates could suggest that:

- The variables and criteria used by the WHO to describe the state of the art within the pillars are not the most suitable criteria for these countries.
- Crashes in countries with seemingly well-developed pillars have not yet been affected by the implemented improvements.
- The improvements describing the status of development in the pillars have no effect on crashes.
- The criteria do not reveal the true status of pillar development.

7.2 Specific Illustrations of Road Safety Development in OIC Member Countries

A literature search was carried out for documentation describing road safety studies and evaluations in selected OIC member countries. The search was limited to documents focussing on road safety studies and related to national road safety developments and trends. The search focussed primarily on documentation in English language. Given the limited scope of this literature study, this part of the study concentrated on two countries from each OIC region. For each country an overview on road safety, based on the five pillars described in the UN's Global Plan, was prepared on the basis of available literature. Some findings are presented below, providing examples of how road safety management aspects are addressed in selected OIC member countries. Appendix 4 presents more elaborate results of the literature review.

African Region

Nigeria

Road safety management

- Established sixteen additional Federal Road Safety Corps Command Units;
- A five-year action program, The Nigeria Road Safety Strategy, is established;
- An important stakeholder organisation is the Arrive Alive Road Safety initiative;
- Numerous individual operators (e.g. organised transport, private companies) are a main problem for law enforcement;
- Financial penalties are often inadequate deterrents.

Roads and Mobility

- Second longest network in Africa;
- Intense traffic pressure on the road network in Nigeria;
- Large metropolitan areas face new problems due to an increasing traffic demand and congestion;
- Significant higher fatality rating in festive and seasonal periods;
- The road network is prone to natural environmental factors;
- No appropriate budget for road construction and maintenance.

Vehicles

- Non-standard and unsafe vehicles still in use;
- No applied vehicle standards;
- Fatal accidents involving minibuses are most prevalent on highways;
- Poor vehicle maintenance
- Most of the crashes involving cars were reported in metropolitan areas;
- Free safety checks for all vehicles on the highway;
- Introduction of speed limiters on commercial vehicles;
- Standardisation of school bus designs.

Road Users

- Poor driving culture;
- Drink-driving with lack of experience often results in fatal accidents;
- Human error major factor in traffic crashes;
- Nigeria launched intensive road safety campaigns.

Post-crash Response

- Multiple emergency telephone numbers;
- No injury surveillance systems;
- 26 new transport ambulances were introduced in 2015;
- The Federal Road Safety Corps established emergency ambulance points along major corridors.

Road Safety Data

- The FRSC is collaborating with the Federal Ministry of Health for the collection of injury data;
- The FRSC is introducing the new template for the collection of road traffic crash data.

Cameroon

Road safety management

- Large percentage has not received any formal driver training;
- Enforcement of laws is poor due to the numerous individual operators and ambiguous laws;
- Lack of transparency in the administration of penalties;
- Financial penalties are often inadequate deterrents.

Roads and Mobility

- Most of the maintenance activities are poorly planned and ineffective in optimizing the life cycle of road assets;
- Traffic volumes generally low when compared to other middle income countries;
- Around 36 per cent of the unpaved road network carries more than 300 vehicles per day;
- The poor road condition prohibits the easy movement of goods;
- Pedestrians and livestock share the same roads as the motorised vehicles;
- Lack of road signs and road lightning result in dangerous situations at night;
- The untarred roads are prone to potholes and excessive dust.

Vehicles

- No roadworthiness inspections;
- Non-standard and unsafe vehicles are common;
- Trucks are prone to roll-over crashes due to overloading and over speeding.

Road Users

- Males are at an increased risk of road traffic accidents compared to females;
- Drinking and driving is a major problem after dark;
- Human error is a major factor for traffic crashes;
- Evident need for public awareness of traffic and safe driving;
- Launching of intense road safety campaigns and driving school standardisation programs are launched.

Post-crash Response

- Cameroon has multiple emergency telephone numbers;
- No emergency room injury surveillance systems;
- Reports of road crashes channelled through informal and unstructured media;
- The data of an accident is collected by the FRSC, filling in a notebook entry or the paper accident report.

Road Safety Data

- The working age group (15-45 years) is involved in more crashes with motorised vehicles than other age groups;
- Pedestrians account for 34% of the total amount of road users.

Arab Region

Oman

Road safety management

- A Research Council was created as part of the road safety strategy;
- The road safety research program is a collaborative effort between the Research Council and the Royal Oman Police;
- A steering committee has been formed to ensure that research is of high scientific quality and that the research proposals determine the research priority areas;
- The national seat-belt laws have recently been revised to be applicable to both drivers and passengers of 4-wheeled motorised vehicles;
- New national child restraint law and mobile phone law while driving applied.

Roads and mobility

- Travel between cities, especially at night, may be dangerous because of poor lightning, wandering livestock, pedestrians crossing highways, slow moving cargo vehicles and speeding drivers;
- The high number of crashes between July and September can be caused by the tourist season and monsoons;
- Most of the accidents happen during the day between 9.00 and 20.00 on urban roads.

Vehicles

- Periodic vehicle maintenance is mandatory in Oman and vehicles must meet local standards;
- The high increase of the automobile fleet can be caused by the unavailability of a good railway network, water-ways or bus services;

- Private cars are involved in 77% of all road crashes;
- Motorised 4-wheeled vehicles account for 84% of the total vehicle fleet.

Road Users

- No proper education and awareness campaigns regarding traffic risks and traffic awareness;
- Young drivers are over-represented in crashes in Oman;
- Speeding is a major contributing factor to fatal crashes in Oman.

Post-crash Response

- Oman has an emergency telephone number;
- Emergency room injury surveillance systems with qualified personnel are available.

Road Safety Data

- The Royal Oman Police is the sole authority responsible for recording, analysing and publishing road safety data;
- A lot of minor accident cases are settled by the parties mutually at the scene;
- In 2013 the Research Council completed the road accident database.

Morocco

Road safety management

- The Ministry of Equipment and Transport and Logistics has the overall responsibility for road transport;
- The Road and Road Traffic department is responsible for road networking planning and for the design construction and maintenance of road infrastructure;
- The Department of Road Transportation Safety is mainly in charge of road transportation safety in general and for the safety of vehicles and drivers;
- The Department of Studies, Planning and Coordination is mainly responsible for the planning and development of the road transport sector, and for the coordination between various modes of transport in the country;
- Morocco lacks the presence of a dedicated road safety research programme carried out by a dedicated research staff and backed by sustainable funding sources.

Roads and Mobility

- Road conditions vary by season and are prone to heavy rainfall and pot holes;
- The DTRSR recently applied safety measures to improve road safety. They improved the infrastructure through identification and elimination of blackspots.

Vehicles

- There are still non-standard vehicles in use in Morocco;
- Many cars and trucks are poorly maintained and especially trucks are often overloaded;
- Commercial vehicles require an annual inspection and buses are inspected every six months;
- Older cars (older than 12 years) are more often involved in crashes than newer cars.

Road Users

- More than half of the fatalities are represented by vulnerable road users such as pedestrians, cyclists and motorcyclists;
- People between the age of 25 and 64 over-represent the number of road fatalities;
- In Morocco it is forbidden to drive under the influence of (illicit) drugs. However, this measure is not yet enforced;

- In 2013, alcohol use was cited as a contributing factor in 2.3% of all road crashes;
- National drink-driving laws have been developed and adopted.

Post-crash Response

- No emergency room injury surveillance systems;
- Recently the ambulance fleet of Morocco was modernised and improved;
- Emergency medical rescue system and the mobile medical emergency services are established in regional hospital centres.

Road Safety Data

- Crash data are collected at the scene of the crash by the police;
- The data is entered into a database;
- The police can stay in contact with the hospitals to complete or adjust the reports of the accident.

Asian Region

Indonesia

Road safety management

- The road safety partnership is focused on strengthening coordination and management of road safety;
- The Indonesian National Police has an independent agency called the Indonesian National Traffic Police Corps. This police corps is tasked with addressing and enforcing road safety in Indonesia;
- The establishment of Law22/2009 has been an important step. This law is generally for the Indonesian National Traffic Police Corps (INTPC). Under the law, the INTPC is charged with the responsibility for road traffic and transport safety;
- Furthermore, the inclusion of the Provincial and Regency/City Governments in the law, is an important step, ensuring that all levels of the government take an active role in road safety;
- Bringing leaders in Indonesian society, such as religious leaders, into the campaign on road safety can be a very efficient way of creating road safety awareness.

Roads and Mobility

- Indonesia experiences extremely wet days and there can be a lot of dense fog. These factors directly affect the road users and the (unpaved) roads;
- Two of the most critical failings at roadwork sites in Indonesia is the failure to use any advance (road works) warning signs to warn approaching drivers of the workers ahead, and a lack of adequate demarcation signs and markings to protect road workers at the work zone;
- Road conditions in Indonesia are far from ideal.

Vehicles

- Indonesia has a large population of 2- and 3-wheel vehicles. About 83% of all registered vehicles in 2013 were motorised 2- and 3-wheelers;
- Over involvement of buses and trucks are the main factors of accidents with buses and trucks;
- The main reasons that there are a lot of non-standard and unsafe vehicles in use is that there are no applied vehicle standards;

- Vehicles with faulty brakes are a common cause for traffic crashes marked with "severe injury".
- Every vehicle is supposed to have a proper certification, given by the local transportation agency, before going on the road.

Road Users

- The majority of traffic fatalities are registered among bus drivers and passengers (35%), riders of motorised 2- or 3-wheelers (36%) and pedestrians (21%);
- Young people (10-24 yr.) and people of productive ages (25-50 yr.) account for a large proportion of accidents.

Post-crash Response

- Indonesia does have multiple emergency telephone numbers and a few basic emergency care centres at hospitals;
- The hospitals are only located in urban areas;
- The lowest level of emergency care is found in the rural areas, where most facilities are community-based and provide only service for primary health care.

Road Safety Data

- Indonesia has a new data system named the IRSMS Accident Information System;
- IRSMS is designed to provide valid, reliable and verified data for road accidents in Indonesia;
- At present, data is collected by police filling in a notebook entry or a paper accident report form at the accident site.

8 Survey Results on Road Safety Management and Data

8.1 Approach of the Surveys

A two-stage survey was conducted to gather input from stakeholders involved in road safety management in the OIC member countries, serving as an input for the analysis in the synthesis phase, and to validate the findings of the literature review. The results are analysed and presented on the basis of the five road safety pillars used by the World Health Organisation.

The Stage 1 survey targeted the COMCEC focal points of the OIC member countries. The feedback from this survey, in combination with additional contact persons from the research team itself, facilitated the identification and selection of a core group of 10-12 OIC-Member Countries that have the highest potential for providing more detailed information through a detailed questionnaire (Stage 2). The Stage 1 survey was filled out by nine out of the 34 member countries that have registered to the COMCEC Transport and Communications Working Group[2] as presented in Table 19.

Table 19: Response to stage 1 survey

Group	Number of Respondents	Countries:
High income	1	Qatar
Middle income	5	Iran, Jordan, Palestine, Senegal, Morocco
Low income	3	Gambia, Guinea (partial response), Uganda
Total	**9 respondents**	**9 countries**

Source: Stage 1 survey, Ecorys

The Stage 2 survey has a more topical focus, concentrating on policy aspects. The Stage 2 survey was filled out by 16 respondents from 10 different countries, as presented in presented in Table 20.

Table 20: Response to stage 2 survey

Group	Number of Respondents	Countries
High income	1	Qatar
Middle income	1	Jordan
	1	Tunisia
	3	Indonesia
	3	Iran
	2	Nigeria
	1	Senegal
Low income	1	Bangladesh
	2	Gambia
	1	Uganda
Total	**16 respondents**	**10 countries**

Source: Stage 2 survey, Ecorys

[2] Contact points in the field of transportation in the remaining 22 OIC Member Countries are not available and it has been decided to distribute the survey to the 34 available contact points.

Based on the literature review, the results of the survey are categorised into high/middle income countries and low income countries, which allows for validation of the findings of the literature review. Due to the limited number of high income countries in the survey, high and middle income countries are combined in this section.

It should be noted that not all respondents completed the entire questionnaires; eight respondents fully completed the Stage 1 survey questionnaire and 11 respondents fully completed the Stage 2 survey questionnaire. Some of the questions in the Stage 2 survey were not mandatory. It should also be noted that some countries are represented by more than one respondent in the Stage 2 survey. The section below summarises the main findings of the surveys.

8.2 Survey Results

Road safety is considered to be a high priority issue in all of the countries that participated in the survey.

Road Safety Management

Most of the countries have a national strategy. Most respondents indicated that if a country had a road safety lead agency, the responsibilities of the agency were limited to road safety policy development and implementation and legislation. Road safety funding was not a core function of the lead agency. Not all lead agencies in the low income countries have a specific and dedicated budget allocated for road safety and most of the lead agencies are considered to have insufficient resources means to perform their tasks.

High and medium income countries mostly coordinate responsibilities on road safety policy between the different government agencies and departments, while low income countries mostly coordinate responsibilities on education & training and vehicle legislation & standards. Road safety in the high and middle income countries is generally well-coordinated, while it is less well-coordinated in the low income countries.

The participating low income countries reported not to have performance targets, while most of the high and middle income countries reported to have such targets. Based on the survey results, R&D tasks are similar in high, middle and low income countries. High and middle income countries have more road safety instruments and tools to ensure higher road safety, such as road safety audits and inspections. Expansion of the road network and improving maintenance have a high priority in all of the countries.

Roads and mobility

Road design standards for national roads are considered to be of good quality in high, middle and low income OIC member countries. For regional roads, standards are generally better in high and middle income countries than in low income countries. Local road design standards are considered to be average to good in high and middle income countries, while mostly considered to be poor in low income countries.

Vehicles

In general, low income countries in the OIC region have lower vehicle standards and less compulsory inspections. In high and middle income countries roadworthiness inspections are common and some high and middle income countries require vehicles to be equipped with airbags, while this is not the case in the low income countries.

Road users

Helmets are compulsory in most of the OIC member countries that responded to the surveys. Also theoretical and practical driving tests are compulsory. In some of the OIC member countries it is not compulsory for motorcycle drivers to wear protective clothing. Child restraints are also often not compulsory.

Post-crash response

Most of the responding OIC member countries have a national response telephone number for reporting crashes. However, only a few countries have procedures for crashes involving vehicles carrying hazardous materials.

In general, the low income countries have less post-crash procedures than the high and middle income countries.

Road safety data

The low income OIC countries have clearly less data available, especially on the number of victims hospitalised and road geometry.

Section 3: CASE STUDIES

9 Case Study: Bangladesh

9.1 Introduction

Bangladesh has been selected as one of the case studies. Road transportation is the major mode of transport in Bangladesh. Over 70 % of passenger travel and much of general goods movement occur on roads and highways (Mazharul Hogue et al., Road Safety in Bangladesh and Some Recent Advances). Road transportation is vitally important to the economic and social welfare, however, each year thousands of people are killed and injured on roads in Bangladesh. These losses of lives and injuries affect Bangladesh socially and economically (Abdul Hamid, Road Safety Situation in Bangladesh). Consequently, the challenge Bangladesh is facing, like many other countries in the world, is maintaining the role of transportation in general, and the road sector specifically, as a catalyst for socio-economic development, while improving road safety by minimizing accident hazards and risks and consequently reducing people killed and injured on roads.

Bangladesh, a country having an area of 147,570 km2 and a population of around 156 million, has about two million motorized and could be over three million non-motorized vehicles (Mazharul Hogue)). Of the motorized vehicles about 67% are 2 and 3 wheeler vehicles and the rest are vehicles of different categories, such as cars, jeeps, buses, truck, pick-ups, etc. Among the 2 and 3 wheeler vehicle around 85 % are motorcycle, as indicated in Table 21. The number of vehicles is steadily increasing along with the increase of road mileage (World Health Organisation, 2014; 2015).

Good quality roads have been constructed in recent years, adding speed to transportation and frequency of movement of people. Simultaneously, the number of road accidents has also soared highly. It is feared that with the continued expansion of the road network and the growth of traffic, this adverse trend is to continue in the future, unless effective remedial measures are taken with co-ordination of all concerned agencies through national action plans (National Road Safety Council, 2013).

9.2 Road Safety Performance

Police reported road accidents in Bangladesh claim, on an average, about 2,800 lives and injure another 5,200 each year (Accident Research Institute, 2014). It should be noted that the sources of these figures are police reports, which are based on the definition of “died at scene of crash”. WHO in its annual Global Status Reports on Road Safety (2015), included annual estimated road traffic fatalities of over 20,000 and a mortality rate, defined as rate of road safety casualties per 100,000 population, of 13.6.

Some accident statistics are presented below, indicating the size and the character of the road safety problem in Bangladesh (Mazharul Hogue et al., Road Safety in Bangladesh and Some Recent Advances):

- Pedestrians are the most affected group and are involved in more than 47% of road accidents and 49% of all casualties. In urban areas pedestrians accounted for 62% of fatalities and in Dhaka city this is nearly 75% (Sohel Mahmud, 2014).
- Around 73% of people killed in police reported accidents are male. People in the age group of 15-44 years account for more than half of the road accidents casualties. One-third of the victims are adult males of age between 21-40 years. Children (under 16 years) are heavily involved in road accidents at an estimated rate of 22% of all road accident fatalities.
- According to the Accident Research Institute (ARI) about 43 % of reported accidents occur on National Highways with a number of serious black spots (30% of accidents take place on 4% of the highway network). Accidents on national highways are more severe – about 48% of accidents on national highways is fatal versus 14% on city roads (Mazharul Hogue et al., Road Safety in Bangladesh and Some Recent Advances).
- Trucks and buses are highly represented in accidents: heavy vehicles are especially strongly involved in accidents with pedestrians, accounting for 79% of all accident with pedestrians (37% trucks; 20% buses and 22% minibuses).
- According to ARI, In national highways, the following four accident types account for close to 84% of the total accidents:
  - Hit pedestrian (42%).
  - Head on collision (20%).
  - Rear end collision (13%).
  - Overturning (9.0%).
- According to ARI, the following two accident types are very common in city road,:
  - Hit pedestrian (49%).
  - Rear end collision (24%).
- Accident data for other road types like village road or upzilla road are not being monitored accurately due to poor vigilance of police and lack of awareness of local dwellers. Besides, the administrative procedures of a police case also motivate them to avoid the case. Which is why it is hard to get characteristics analysis of those roads?
- The economic impact of road crashes in Bangladesh is high and is estimated at 1.6% of GDP, based on the WHO 2015 Global Status Report. The fact that (young) adult men, as indicated above, are relatively often involved in road accidents, contributes to the socio-economic impact, as this group is often generating income, providing for their families.

9.2.1 Causes of road accidents

Causes of road accidents are different for national highways and for the city areas. In national highways hit pedestrian and head on collision are the most dominant types of police reported accidents. The root causes that are responsible for this can be divided into three main factors, i.e. road, vehicle and user, as illustrated in more detail below.

Road related causes that are responsible for road accidents are:

- National highways lack standards in design. For example, except some new segments of road, all national highways are two-way highways without medians or some form of separation between the driving directions. For this reason head on crash took place frequently.
- Frequent connections between national highways and regional roads deteriorate the safety situation in Bangladesh. For example, until now Bangladesh does not have any access control highway and national highways have been connected by low speed roads, such as regional and even village road. Vehicles from those roads enter into the national road without any resistance and create sudden situations for through traffic and leads to accidents.
- Inadequate shoulders (hard and soft) are another reason for accidents since pedestrian and non-motorised vehicles (NMV) have to share the main carriageway, resulting in pedestrian or rear end crashes.
- Heterogeneous traffic characteristics are also responsible for road accidents. NMVs, such as rickshaws, bicycles and vans, use the highways together with high speed vehicles, such as, buses, trucks and passenger cars. In addition, accidents were also triggered by some locally made vehicles, such as nosimon and korimon (see section on safety vehicles). The speed gaps between vehicles are the main cause of excessive overtaking; a prime cause of head on and pedestrian accidents.
- No service road for local user and short distance traffic. For this reason, local users have to use the main carriageway or national highway since they do not have any options. This situation creates conflicts.
- Vision obstruction in curve, intersection and level crossing due to plantation and temporary or permanent construction like shops and so on. This is one of the main reasons for head on and level crossing crash in national highways.
- Road side market and shopping activities are a key reason for pedestrian crashes, which is very common in Bangladesh.
- Lack of appropriate road signs and markings is another reason of road accidents in Bangladesh. During the construction period of a national highway, road signs and markings are placed, but problems arise after a few months. Road signs are often covered by roadside trees, leaves or tree branches, especially in the rural context. In addition, traffic signs on village road often get stolen because sign poles and plates have an economic value. During the maintenance period, an overlay of bitumen is placed on the carriageway, covering the road markings. This is not always restored properly.
- Sharp curves and narrow bridges without proper transition and tapering is also a crash prone area in Bangladesh especially on regional roads. Due to insufficient budget or policy decision, authorities are unable to provide curve widening or extra width of the bridges. This results in dangerous situations, notably vehicles overturning, hitting object and pedestrians.
- Lack of footpath and unauthorised use of footpath is a common reason for pedestrian accident in urban context. This situation pushes a pedestrian to the road, resulting in accidents.
- Unauthorised parking and loading, unloading activities are other management related causes of road accidents. In city areas, especially in shopping mall and recreational zones, parking facilities are absent. For this reason, vehicles are parked on the main carriageway,

obstructing the through traffic. Moreover, in other roads like national and regional roads, designated places for loading and unloading, such as bus bays, are absent. This scenario is very common and creates unsafe situations.

Vehicle related causes for road accidents:

- Many unfit vehicles with poor tyres, poor brakes, broken windscreens and missing or malfunctioning indicators are used on national highways, causing vehicle roll-over (overturning), head-on and pedestrian accidents.
- Vehicle modification is another cause of road accidents in Bangladesh. Buses and trucks have been modified beyond the design standard. Trucks are modified by extending the sides and load-bed with bars, angle iron and sheet metal so as to carry extra goods. When the extended portion hits other vehicle it can damage and penetrate the other vehicle. Buses are usually modified by adding extra seats to carry more passengers. As a result, it reduces leg room and makes the situation compact, increasing casualties after accidents.
- There are many locally made vehicles (three-wheeler) with unauthorised configurations, which are causing accidents in national, regional and other roads. These vehicles do not have a proper brake system, power system, indicator system or lighting system, but carry around 10 to 12 people on a single unit. These types of vehicles are not able to stop quickly or indicate their trajectory and cause various types of crashes.
- Lighting system or retro reflective stickers are absent on many bicycles whereby cyclists are notoriously difficult to see on dark, unlit roads.

User related causes for road accidents:

- Drivers are not well educated. In most cases, drivers know the practical things of driving, but do not know associated theoretical issues, such as defence driving, meaning of sign – marking, understanding the hazard and required reaction.
- No specific driving time requirements and timetables/duty rosters for professional drivers, such as truck, bus or taxi drivers. As a result, sometimes a driver has to drive around 20 hours a day which creates fatigue and decrease awareness. In the driving license delivery system, a screening process for safe driver is absent. Only some practical issues are checked, but the scope for cognitive impairment measurement and perception towards road safety of drivers is limited.
- Pedestrians are unaware of the safe rules of road crossing and try to cross the road at locations without pedestrian crossings.
- Pedestrians are very reluctant to use footbridges. Pedestrians cross the road at grade to maintain the shortest travel distance between origin and destination. This creates conflicts between vehicles and pedestrians.
- The use of motorcycle helmets is still unpopular in Bangladesh, especially by youngsters.

According to ARI[3] these are key contributing factors in road crashes. These factors lead to excessive speeding, overloading, dangerous overtaking, reckless driving, carelessness of road users, failure to obey mandatory traffic rules and regulations, variety of vehicle characteristics

[3] As reported by Shifun Newaz of Accident Research Institute (ARI).

and defects in vehicles and conflicting use of roads. Furthermore, road quality factors are important. Other issues of concern are: under-reporting of road crashes; defective and non-roadworthy motor vehicles; incompetent drivers; road engineering and environmental deficiencies; inadequate in police inspection and law enforcement; poor road user behaviour and safety education and institutional weakness.

Based on the above, it can be concluded that Bangladesh is faced with a number of severe underlying problems which contribute to the poor road safety situation. The problems, as well as possible solutions, are addressed in the next sections of this report on the road safety pillars.

9.3 Road Safety Management

National Road Safety Strategy

The National Land Transport Policy (NLTP) was adopted in 2004 by the Planning Commission of Bangladesh, which sets a vision for "providing safer roads" and outlines policies such as road safety auditing at all phases of road project development, construction and maintenance. The policy also includes adopting speed restrictions on roads and safety improvement of existing roads (National Road Safety Council, 2013).This document provides the policy basis for road safety in Bangladesh, for example in the annual National Road Safety Strategic Action Plans, including a long-term vision and short term target, and practical road safety manuals and guidelines, as presented below.

National Road Safety Strategic Action Plans

Each year National Road Safety Strategic Action Plans (RSAPs), covering a three-year period, are prepared in Bangladesh. The first RSAP covered the period 1997-1999. Bangladesh Is now addressing the seventh RSAP, covering the period 2014-2016 and preparing the RSAP for 2017-2019. The RSAPs contain a number of sections, with objectives, as well as further detailed sub-sectors, with actors involved, actions and timing. As an illustration, the most recent RSAP includes the following sections: (i) planning, management and co-ordination of road safety; (ii) road traffic safety accident data system; (iii) road safety engineering; (iv) road and traffic legislation; (v) traffic enforcement; (vi) driver training and testing; (vii) vehicle safety; (viii) road safety education and publicity; and (ix) medical services for road traffic accident victims[4].

The RSAP also includes the *vision for road safety and the goal for road safety* for the specific RSAP. For the 2014-2016 RSAP this following vision and goal were defined:

- The *vision* is to reduce the number of road accident fatalities by 50% and to reduce the number of road accidents by 30% in the coming decade.
- The *goal* for the period 2014-2016 is to reduce the road accident fatalities by 12-20% annually.

[4] These nine sectors are similar to the sectors defined in the ADB funded ESCAP road safety guidelines.

The RSAPs provide a clear set of actions, linked to sub-sectors, providing a broad overview of relevant road safety aspects. Having said so, some critical remarks on the RSAPs have been made (M. Sohel Mahmud et al):

- The action plan is just the compilation of some activities of different organisations on road safety or related issues. This plan is not prepared on the basis of priority needs to achieve a certain goal.
- There is no monitoring mechanism nor has an organisation been assigned the task of monitoring and evaluation.
- The RSAPs have no indication of the budgetary requirements and way of funding support.
- Though the RSAPs are prepared for a certain year, there is no timeframe to complete the tasks and report the results. Some tasks are repeated in different sections of the RSAP.

In conclusion, the RSAP provides a basis for structuring actions across different sectors to contribute to road safety in an integrated manner. In practice, there is room for improvement to make the RSAPs more effective, i.e. by better coordinating actions and linking them to SMART objectives; by monitoring and evaluating progress and results; by placing actions in a clearer timeframe, where possible with priorities; and by linking funding requirements to the actions.

Road safety manuals and guidelines

Road safety manuals and guidelines are prepared at various levels:

- The Roads and Highways Department (RHD) has prepared a number of manuals, including the Guidelines for Road Safety Audit, Road Safety Improvement Works Manual, Road Safety Users Guide, Road Geometric Design Manual, Police Training Handbook, Road Safety Engineering Toolkit, Pavement Design Guide, Guidelines for Identification of Sites for Road Safety Improvement Works, A Guide to Safer Road Design.
- The Bangladesh Road Transport Authority (BRTA) has developed a Traffic Sign Manual.
- When visiting the Accident Research Institute (ARI) a recent Rural Road Safety Manual (RRSM) was shown, including actions towards addressing hazardous situations and black spots in rural roads, as well as options for solutions and implementation techniques. A training manual for engineer titled “Road Safety Training Manual (RSTM) has also been prepared by ARI, BUET. The manual that was reviewed by the contractor seemed to be of a very practical nature, with ample of illustrations.

According to ARI, there have been issues related to manuals that are based on international standards (prepared by international consultants).These manuals cannot be fully applied to the local situation.

Road safety-related laws and regulations

According to the Global Status Report on Road Safety, there is a national speed limit law, national drink-driving law and national motorcycle helmet law in force in Bangladesh. According to ARI,, enforcement of these laws is poor. Current legislation does not adequately provide for improving the wearing of seat belts and using child restraints. The national seat-belt and child

restraint laws have not yet been implemented even though some 28% of the total reported fatalities are passengers in 4-wheeled cars and light vehicles. It has become a priority to redress this situation and to introduce and enforce a seat belt and child restraints law. This must be supported by public road safety awareness to decrease road fatalities in Bangladesh. No national law is in place yet regarding the use of a mobile phone whilst driving.

During interviews it was mentioned that a Road Safety Act was under development. This process is at its early stages, with the drafting process just started. The initiative is at BRTA and emphasis will be (amongst others) at vehicle registration, driving licenses and physical tests.

Institutional setting and Lead Agency

A number of organisations are active in improving road safety in Bangladesh. These include the National Road Safety Council (NRSC), District Road Safety Committees (DRSCs), the Accident Research Institute (ARI), the Bangladesh Road Transport Authority (BRTA), the Road and Highway Department (RHD),the Local Government Engineering Department (LGED), the Bangladesh Police, including Highway Police, the Road Transport and Highway Division (RTHD), the Ministry of Home Affairs (MOHA), the Ministry of Health (MOH), the Ministry of Information (MOI), the Bureau of non-Formal Education (BNFE) and NGOs, such as Bangladesh Rural Advancement Committee (BRAC), Nirapad Sarak Chai, Work for Better Bangladesh (WBB), Safe Community Foundation, Poribesh Bachao Andolon.[5] The roles of some of these organisations are presented in more detail below (Sohel Mahmud, 2013).

National Road Safety Council

The National Road Safety Council (NRSC) was established in 1995 under the Ministry of Communications, initially with the support of WB funded road improvement project of RHD; now a unit of BRTA. An independent organization called Road Safety Cell (RSC) was setup and acts as secretariat to the NRSC at BRTA. The NRSC Secretariat carries out preparation of plans, coordination, monitoring and evaluation of planned activities assigned to different agencies and implementation of some programme assigned to it. The Secretariat severely lacks man-power, logistics and facilities; hence is yet to become fully functional.

The NRSC comprises of representations from all key agencies including transport owners, workers associations, professionals in the field, the transport regulator, law enforcers and road authorities. The NRSC acts as a body for approving and driving forward the national road safety policy and plans. The NRSC also formulates the National Road Safety Action Plan. Besides, the NRSC is responsible for holding periodic meetings to provide policy level guiding decisions and directives to road safety related stake holder organisations, as mentioned above. As mentioned earlier, meetings of the NRSC are not regular or structural in nature.

District Road Safety Committee

District Road Safety Committees (DRSCs) at the district and metropolitan levels were formed in 1995 to implement programmes and policies of the NRSC and undertake local road safety

[5] Based on organisations listed in the National Road Safety Strategic Action Plan, 2014-2016.

programmes according to local needs. There is an Executive Committee headed by the chairman of BRTA to co-ordinate NGOs on road safety issues. Initially significant impact was made by the DRSCs, particularly in the awareness development at local level (Sohel Mahmud, 2013). Due to lack of co-ordination, integration between local and central committees and internal communication among the members of the committees, as well as shortage of resources, DRSCs have lost some of their impact. Recently, initiatives have been undertaken to make DRSCs active and functional again.

Accident Research Institute

An independent Accident Research Centre (ARC) was established at Bangladesh University of Engineering and Technology (BUET) in 2002 to carry out scientific research for clear understanding of the road safety problems and ascertaining the underlying causative factors, which contribute to accidents on roads, railways and waterways. In 2007 ARC was renamed the Accident Research Institute (ARI), under the Ministry of Education at BUET.

ARI is carrying out activities in road safety research, education, investigation (data analysis, black spot analysis, investigation of major accidents, etc.) and training and awareness programmes (organisation of events, platform for sharing best practices, development of networks, etc.). ARI is expected to play major role in developing pragmatic, cost-effective scientific solutions and bring about significant improvements in the capability of the professionals and workers in the field of transportation to a meaningful level of expertise for accident prevention and injury control and thereby contributing to the safer road environment for all users and operators. For drivers and driving instructors ARI has prepared a "Safe Driving Manual" which is written in the native language (Bengali) so that users can easily understand it. In addition, two manuals for rural road safety, namely "Rural Road Safety Manual (RRSM) and "Road Safety Training Manual (RSTM)" have also been prepared by ARI as part of a World Bank funded project. ARI has conducted many training courses for engineers, police and other professionals on road safety. Moreover, a considerable number of scientific accident investigations have been carried out by ARI.

ARI is now conducting a study on a program titled "Strategic Accident Reduction Programme (SARP)" to select data dictated facts and required safety measures for accident mitigation which is now in very final stage and will be published soon. ARI has one director and seven staff members, which makes ARI understaffed for the large task they are facing. Besides, ARI is now badly in need for some research tools like a driving simulator and crash reconstruction software. Within these capacity limitations, ARI is providing important services towards improving road safety in Bangladesh.

Road Safety units at Road and Highway Department (RHD) and Local Government Engineering Department (LGED)

In January 1999 RHD established a Road Safety Division to deal with the safety aspects of national, regional and feeder roads. There is a severe lack in man-power, vehicles and facilities at the Road Safety Division. LGED has created a Road Safety Cell.

Highway Police

The Highway Police was created in 2005 to maintain and ensure discipline, enforce traffic rules and regulations, improve traffic management, prevent highway crime, collect and disseminate intelligence and police patrolling as well as ensure safety on state highways. In 2009 the Highway Police Regulation came into effect in line with SRO-252, Law/2009. The Highway Police operational area is divided in four regions, i.e. Comilla; Gazipur; Bogra and Madaripur, in total including 7 city corporations and 97 municipalities. Each region is subdivided into different zones.

The present Highway Police force (March 2016) comprises 2,215 staff members, employed at the Head Quarters, the four highway regional offices, 10 ASP Circle Offices, 35 Police Stations and 37 outposts. The vehicle park consists of 8 Jeeps, 13 cars, 86 pick-ups, 2 microbuses, 2 ambulances and 177 motorcycles. Given the size of the network and the number of staff, the vehicle park is limited. The Highway Police is active in road safety awareness programmes, amongst others through community policing. Leaflets are produced and meetings are organised to support this process.

The Highway Police indicates a number of limitations, including insufficient number of police stations and out posts; insufficient human resources; insufficient logistics support and large distance between units. The Highway Police face acute mobility problems due to unavailability of vehicles and other transport facilities including fuel cost, as well as shortage of qualified and capable manpower, logistics and equipment (S. M. Sohel Mahmud et al., 2013).

NGOs – road safety voluntary and advisory groups

Various NGO's such as the Bangladesh Rural Advancement Committee (BRAC), Nirapad Sarak Chai, Work for Better Bangladesh (WBB), Safe Community Foundation and Poribesh Bachao Andolon are undertaking road safety campaigns aimed at different groups of road users throughout the country and helping in creating massive safety awareness, particularly at the local level.

Funding mechanism and financial resources

Interviews with stakeholders have indicated sustainable and transparent funding to be one of the key problem areas for improving road safety performance in Bangladesh. This is reflected in staff capacity limitations, e.g. at ARI or the Highway Police, or lack of equipment or facilities, for example police enforcement vehicles, ambulances or driving simulators. No insight was gained on the amount of funding available to implement road safety strategy.

9.4 Roads and Mobility

Bangladesh has road network of 325 681 kilometres including six types of roads, i.e. national highway (including main and national roads), regional highway, zilla road[6], upzilla road[7], union road and village road. The Roads and Highway Department (RHD) is responsible for first three

6 A zilla road is a district road.
7 An upzilla road is a sub-district road.

types of road while the Local Government Engineering Department (LGED) is responsible for other three road types. The network comprises some 3 812 km of highways, main or national roads (1.2 %); 17,488 km of regional and zilla roads (5.4 %) and 304,379 km of other roads (93 %)[8]. Of the total road network, 65.5% are unpaved. The general condition of the road network in Bangladesh is considered poor. One of the main issues of having safe roads is the maintenance of roads (Mazharul Hogue & Salehin, 2013; Sohel Mahmud et al., 2009). There are regular inspections of existing road infrastructure but road maintenance is not always carried out and roads tend to become more dangerous. It has been reported that the construction of new roads has a high priority, whereas road maintenance is given low priority (Sohel Mahmud et al., 2013).

Design standards do not seem to be road safety driven, as road construction follows standard geometrics with little concern for road safety. Road safety does not feature explicitly in either the standards or the design process. It should be noted that safety manuals, handbooks and guidelines have been developed, including the Road Safety Geometric Design Manual, the Road Safety Engineering Toolkit, the Pavement Design Guide, A Guide for Safer Road Design, often as part of international technical assistance projects. These manuals and guidelines are not structurally applied. As mentioned earlier, a significant concern is that the manuals are not tailored to the situation in Bangladesh and are based on international guidelines and standards.

Some aspects related to road construction and maintenance need to be highlighted for a better understanding of road safety in Bangladesh.

- Firstly, national highways and regional highways are constructed by RHD by following design and construction standards as far as possible. But during construction, local people or road side dwellers occupy the land adjacent to the new road for business purposes. In those occupied spaces, inhabitants build different permanent or temporary structures, such as houses, markets, mosques, restaurants, etc. All those facilities need access, which is taken from the national highway by driveway or direct connection. Within a very short period, a previously rural area is transformed into a ribbon development sub-urban area with lots of human activity. This obviously affects the road safety situation once highway construction is completed. It also limits the scope for future widening or safety works due to the land scarcity. To date, the Government does not have any specific policy to control the road-side land use management.
- Secondly, maintenance is often not carried out in an optimal way. Functional capacity, safety and service life of a pavement depends on how quickly a crack or damage can be identified and fixed. By addressing a small crack or damage at an early stage, larger damage, such as big pot holes and shoulder damage can be avoided. To do so, regular inspection and maintenance is essential; however, this is often absent. Road damage is often fixed when roads are deteriorated to such an extent that road rehabilitation is needed, at much higher costs. LGED and other local government authorities, such as union parisod and paurosova, construct village roads of Bangladesh. In this case, LGED usually allocates the funds, although the local

[8] Roads and Highway Department (www.rhd.gov.bd) and Local Government Engineering Department (www.lged.gov.bd)

authority can also undertake construction by applying funds received directly from the government. Usually, local decision makers are more enthusiastic to construct new roads than maintaining existing ones. The fact that building new roads creates public support is an important factor in this process. As a result, existing village roads often deteriorate at a rapid rate.

- Thirdly, the roads under the LGED jurisdiction, such as upzilla roads (UZR), union road (UNR) and village road (type A & B) have to deal with local issues and problems during construction. The land on which LGED roads are constructed come from donations of people living adjacent to the (proposed) roads. The LGED does not have any land acquisition policy and they cannot change the alignment of an existing road. The very first stage of a LGED road is an earthen road only for pedestrians. Due to local demands and mobility requirements, these roads and tracks evolve and get paved and widened. Since the land comes from the local people without any compensation, it is very hard to maintain standards and in most of the cases road safety is compromised. The above-mentioned situation has been observed by the expert team of ARI, who have visited many routes under control of the LGED. For this reason, it is very hard to incorporate safety features during construction. For instance, sharp and non-standard curves are causing accidents regularly, but it is not possible to make it mild curve or at least widen the outside because of inappropriate land acquisition policy. This also applies to hazardous locations, such as intersections, narrow bridges, school areas or market areas.
- Fourthly, it is evident that around 74 percent of all metropolitan area accidents are occurring in the capital Dhaka, where most of the collisions fall in the category “hit pedestrian”. Pedestrian fatalities per million population is around 488 and the trend is rising. At the same time there are no guidelines for road safety in the city area.
- Finally, according to ARI, the budget allocation for road safety is insufficient in Bangladesh. Road safety audits are to a large extent absent and road safety research funds are very limited.

An evaluation aimed at measuring the effectiveness of black spot analysis and improvement on the Dhaka-Aricha highway corridor revealed that the major improvement measures included the widening of the carriageway along with alignment correction, construction of bus bays, installation of concrete guard posts, warning gates with speed reducing signs at both entry and exit points (S. M. Sohel Mahmud et al., 2013). The limited site-specific safety improvement measures undertaken were very effective in reducing the frequency, as well as the severity of accidents. However, in a few instances the implemented measures did not produce the desired level of positive effects because of the presence of intense roadside hawking and non-motorized transport (NMT) activities, conflicting land use (such as rice drying paddies) and the absence of enforcement measures.

There seem to be no specific projects aimed at road safety improvement regarding road infrastructure, although road safety is sometimes included in larger projects. This approach has resulted in less attention being given to road safety in road design, operation and maintenance.

In Bangladesh road safety audits are introduced by the RHD on a number of locations on the national highways.

In general, vulnerable road users, such as pedestrians and cyclist, are poorly protected. The infrastructure is shared by motorised and non-motorised transport, exposing vulnerable road users to dangerous situations.

9.5 Vehicles

Bangladesh has a vehicle population of about two million motorised vehicles and an estimated three million or more non-motorised vehicles (Mazharul Hogue & Salehin, 2013; Sohel Mahmud et al., 2009). Of the motorized vehicles about 60% are 2 and 3 wheeler vehicles and the rest are vehicles of different categories, such as car, jeep, bus, truck, pick-ups, as presented in Table 21.

Table 21: Registered vehicles in Bangladesh; total number by year of registration.

No	Type of Vehicle	<2010	2011	2012	2013	2014	2015	>May 2016	Grand Total
1	Ambulance	2,793	219	181	243	338	480	162	4,416
2	Auto Rickshaw	126,763	20,423	23,545	15,697	19,897	20,000	4,690	231,015
3	Auto Tempo	14,266	175	626	395	500	1,095	391	17,448
4	Bus	27,778	1,761	1,439	1,107	1,488	2,391	1,456	37,420
5	Cargo Van	3,522	489	282	687	608	399	252	6,239
6	Covered Van	5,658	2,354	1,421	2,271	2,869	2,354	1,115	18,042
7	Delivery Van	17,063	1,004	774	894	1,176	1,719	940	23,570
8	Human Hauler	6,520	1,152	715	385	225	1,142	1,229	11,368
9	Jeep (Hard/Soft)	32,286	2,134	1,569	1,314	1,870	3,601	2,224	44,998
10	Microbus	66,379	4,051	3,044	2,537	4,313	5,224	2,793	88,341
11	Minibus	25,644	276	249	148	256	323	193	27,089
12	Motor Cycle	759,257	114,616	101,588	85,808	90,685	240,358	100,887	1,493,199
13	Pick Up (Dbl./Sngl.)	32,240	10,460	7,625	6,553	9,554	10,257	4,271	80,960
14	Private Passenger Car	219,830	12,950	9,224	10,472	14,699	21,062	9,671	297,908
15	Special Purpose Veh.	6,371	396	226	227	172	296	236	7,924
16	Tanker	2,706	317	195	226	362	324	163	4,293
17	Taxicab	44,380	75	172	51	374	88	8	45,148
18	Tractor	20,600	5,200	3,494	1,885	1,522	1,699	898	35,298
19	Truck	82,871	7,327	4,335	5,129	8,136	6,330	2,554	116,682
20	Others	1,317	7	1	1,080	1,595	2,073	1,540	7,613
Total		**1,498,244**	**185,386**	**160,705**	**137,109**	**160,639**	**321,215**	**135,673**	**2,598,971**

Source: Annual Report for Vehicles Registration, BRTA

Road accidents disproportionately affect the poor given the fact that poor people are forced to use non-standard and unsafe vehicles. All kind of road users, particularly rickshaw operators are unaware of traffic safety and are putting lives at risk.

The above especially applies to so-called nasimon and karimon, locally made improvised three wheelers (flatbed tricycle) used in the urban areas and also on the highways. A study carried out

in Faridpur Medical College Hospital from January through June 2011[9], revealed that 56 (12%) of all patients admitted to the hospital during this period, were accident patients caused by nasimon and karimon. Most patients (73%) were male; the highest accidents (86%) were observed among 21-30 years age group and most victims (59%) belonged to the low socio-economic status. Most victims (55%) were passengers whilst most accidents (82%) took place in urban areas and on the highways.

Lack of vehicle inspections by the police and national standards admitting vehicles to roads contribute to the presence of non-standard and unsafe vehicles. Currently, standards do not provide for frontal impacts, electronic stability control and pedestrian protection (World Health Organisation, 2015). Given the low enforcement levels, roadworthiness of vehicles is also a problem. The most common defects of vehicles in Bangladesh appear to be worn out tires, loose wheels, overloaded axle and faulty brakes. While many vehicles are not roadworthy in Bangladesh, only 10% of the road accidents is attributed to vehicle defects (Mazharul Hogue, 2014).

Buses and trucks are highly represented in crash statistics, causing around 40% of the total accidents of buses and trucks and have a fatality rating of 35% (Abdul Hamid, 2013). Many pedestrians and light vehicles crashes are likely to be caused by crashes with larger (goods) vehicles which are not fitted with so called 'blind spot mirrors' (Abdul Hamid, 2013).

9.6 Road Users

As stated above, not only vehicle drivers are involved in road crashes but also significant numbers of pedestrians. Reported crash statistics show that in 2010, 47% of road crashes and 49% of all fatalities involved pedestrians, the majority in urban areas. To improve pedestrian safety physically separated spaces for pedestrians both in urban and rural areas are required to decrease the number of road accidents (Abdul Hamid, 2013).

Human error by road users is claimed to contribute to an estimated 90% of road accidents and consequently a large road safety awareness program should be implemented, according to the BRTA. It should be noted that safety awareness and training is taking place in Bangladesh, for example targeted at professionals, transport workers, students, and local people through community policing (as mentioned above). Given the size of the problem, the awareness raising effort needs to be increased.

Nationwide road crash statistics in Bangladesh reveal a serious threat to children and child involvement in road accident fatalities in Bangladesh. This was found to be very high with 22% of the traffic fatalities involving children under the age of 15 years. Also here dedicated awareness activities are needed, including formal education in primary level schools.

[9] Road Traffic Accidents by 'Nasimon' and 'Karimon'-A Study in Faridpur, 2012.

As mentioned above, there are national speed limits and drink-driving and motorcycle helmet laws. However, enforcement of these laws is poor. Also mentioned is that laws on seat belts and using child restraints are lacking.

Incompetent drivers and widespread driving with fake driver licenses appears to be a major concern for road safety in Bangladesh. Strict licensing requirements are critically important. Effective driver testing, good control and registration of driving schools are priority requirements[10]. However, enforcement of these aspects is poor and this gives the wrong message to the public, more specifically that road safety is not important and that disobeying traffic rules and regulations and driving without a valid licence has limited or no repercussions.

9.7 Post-crash Response

Post-crash (emergency) response is not well organised in Bangladesh. There is no national emergency access number, although emergency numbers are published and made available to the general public. Bangladesh has no emergency room injury surveillance system. Furthermore, there is a lack of ambulances. The Highway Police, for example, only has two ambulances to cover the full network[11].

Knowing that time between injury and initial stabilisation is the single most important factor in patient survival, organising prompt emergency assistance and efficient trauma care management are essential in mitigating the injury effects of road crashes. At present there is little evidence of effective trauma care management in Bangladesh.

9.8 Data Collection and Accident Reporting

According to a number of key stakeholders in the process (BRTA, ARI) the data collection and accident reporting process is not functioning optimally in Bangladesh. This is also reflected by the WHO Annual Reports, in which the reported road traffic fatalities are estimated to be under-registered by almost a factor 10 (from 2,538 to 21,316 in the 2015 report), indicating serious under-reporting and/or crash registration.

According to S.M. Sohel Mahmud et al., the Road Traffic Accident database is neither complete nor entirely an accurate record of all road accidents. Since the end of the technical support by DFID to BRTA in early 2005, the BRTA has not had the means to continue with the training of the police on the collection and entry of road traffic accident statistics. Due to lack of continued training and monitoring, the level of under-reporting has increased particularly injury and property damage only accidents. Simultaneously, the quality of the reported data has also deteriorated. ARI is making an effort to reduce this problem through training of police personnel, particularly those that are responsible for the data recording and storing in different police stations, providing technical support and continuous monitoring and guidance.

10 Md. Mazharul Hoque, 2014.s
11 As indicated above, the highway network has a size of 3,812 kilometres.

ARI is also involved in analysing accident data. The ability to understand road crash situations and deliver effective road safety countermeasures is seriously limited by the lack of accurate and comprehensive data on crashes. Accident and casualty data collection systems (police, hospitals and insurance data) need to be strengthened and co-ordinated, involving different agencies and research organisations.

9.9 Conclusions and Recommendations

In Bangladesh a number of initiatives have been taken to improve road safety in the country and to reduce the number of accidents and related casualties and injuries which have a huge economic impact.

Bangladesh could seriously benefit from an increased effort to improve road safety. A pre-condition for making road safety effective is *strong political commitment*. The subject calls for ownership at the highest political level and the will to place road safety on the political agenda. To this end *awareness* is needed of the size and the nature of the problem.

The road safety initiatives would profit from a more *holistic, integrated approach*. Instead of addressing individual measures by individual stakeholders, a more concerted action is needed. Coordination and collaboration between the stakeholders is a must. The Strategic Accident Reduction Programme (SARP) approach, as mentioned earlier, could support this, since it is based on historical data and indicates the programme with the implementing authority.

An additional, related pre-condition is the *availability of sufficient and stable funding* to implement road safety measures. Without political commitment, road safety funding will remain a constant problem. Also part of an enabling environment is the development of an *appropriate legal framework*, which includes seat-belt, child restraint, mobile phone legislation, vehicle standards, and driver's licenses and testing. Legislation only works if laws are properly enforced. As this is a current weakness in Bangladesh, enforcement needs to be improved. Budget should be allocated for road safety research, investigation and education for sustainable and effective outcome.

Another crucial element is the ability to know the size and scope of the problem. To this end *crash data must be collected, recorded and stored in an accident database*. Police must be trained to fill in high-quality accident forms, that are then properly stored. This as input for accident analysis that will be the basis for defining effective road safety measures. ARI is in a position to facilitate this process, by both training police and carrying out accident data analysis.

Research should be the main prerequisite for any kind of transportation safety related activities or improvement project. Nowadays, implementing bodies are planning and conducting activities without proper study and coordination. As a result, projects are not sustainable or compatible. Research should be mandatory and implementing bodies need to apply the outcome of research.

The *National Road Safety Strategic Action Plans* (NRSAPs, see Section 8.3), provide a good basis for coordinating road safety activities amongst partners in Bangladesh. The shortcomings of the

NRSAPs prevent the effective implementation and functioning of the NRSAPs. If the pre-conditions that are mentioned above are met, the NRSAP approach could be revitalised with policy measures that are clearly interlinked based on a clear prioritisation process which is linked to clearly defined objectives and targets; a process of monitoring and evaluating the implementation of the measures, and the effectiveness thereof; clear funding requirements per measure and proper planning of measures.

In order to streamline the above process, a leading agency is needed. Also here basics are in place, with the establishment of the *National Road Safety Council*. Factors preventing the NRSC to function at its utmost potential need to be addressed.

The NRSC is to drive forward the national road safety policy and plan it needs to concentrate on the five road safety pillars with results highlighted below:

- *Road safety management*: these are the factors relating to creating political will; approaching road safety in an holistic, integrated manner; creating an enabling environment with sufficient and stable funding and a supporting legal framework, backed-up by proper enforcement; organising the collection of accident reports and road safety data as input for accident analysis to define effective countermeasures; define a national road safety strategy with clear and SMART (measurable) objectives and targets and National Road Safety Strategic Action Plans to manage the process amongst stakeholders in an integrated way, by a lead agency, which could be the NRSC. Road safety research should be a driving force for any kind of road safety management process and funding should be provided for research and investigation. The Accident Research Institute (ARI), should be supported for scientific research with modern tools.
- *Safer roads and mobility*: improve road conditions and prioritise road maintenance; provide sufficient funding for road maintenance; incorporate road safety in road standards and design; preparation and application of safety manual; provision of service road for all national highways; accommodate for vulnerable road users and NMT; carry out black sport analysis and treatment on a structural basis; increase the use of road safety audits as a means to reduce accidents; develop and further improve relevant manuals, handbooks and guidelines and facilitate platforms to exchange best practices in this field between RHD and LGED. Road safety audit should be carried out for every route. On existing roads, rehabilitation should be done based on road safety audits/road safety inspections. New roads should be subject to road safety audit, during design and following construction.
- *Safer vehicles*: develop standards for vehicles and roadworthiness tests; carry out vehicle inspections by the police and be strict on nasimon and karimon. Existing nasimon and karimon might be allowed in village road with some safe modification like including brake, indicators and so on.
- *Safe road users*: Presently a driving test is not standard and a heavy vehicle driving test and training is totally missing. For this reason, driving test procedures should be modernized with driving simulator (locally calibrated) and practical road test. Invest heavily in road safety awareness program and training for all relevant stakeholders, including professionals

(bus and truck drivers), engineers, students, and local people through community policing; emphasize training and education for children at schools.

- *Post-crash response*: develop emergency assistance and efficient trauma care management as these are essential in mitigating the injury effects of road crashes.

10 Case Study: Cameroon

10.1 Introduction

Cameroon, selected as one of the case studies, is a central African country covering nearly 480,000 km^{2,} with a population of more than 23 million people in 2014 and yielding a population density of 41 persons/km^2. Slightly more than half the population (52%) live in urban areas (Laurea, 2012).

Cameroon has an underdeveloped road network comprising approximately 230,000 km of road of which 4,300 km of paved (Transtat, 2014) and claimed to be relatively well appointed. However, the majority of this network is underdeveloped and a priority programme is being implemented to develop a priority network of some 23,000 km. The rural road network in Cameroon comprises less than 50,000 km of roads, equating to a density of around 100 km/1,000 km^2 of land area which is low by world standards. The country also has a railway network comprising some 1,000 km of single track rail connecting the south-eastern port of Douala with the capital city of Yaoundé and the northern city of Ngaoundéré.

Approximately a quarter of the rural population has access to the road network which is considered to be in a poor condition (Dominguez-Torres & Foster, 2011). The condition of the country's classified paved road network is below the level of peer countries, with only 52% of the classified paved network in good or fair condition. The quality of the roads in Cameroon restricts the competiveness of the private sector with approximately one third of the companies identifying roads as a major constraint for doing business (Dominguez-Torres & Foster, 2011; Laurea, 2012).

Apart from the relatively poor state of the roads, roads are also unsafe mainly due to livestock and pedestrians on the road, inappropriate speeds and poor driver discipline. Road and traffic signs are scarce and speed limits are seldom adhered to due to a general lack of enforcement. On certain routes, the Gendarmerie has intensified enforcement activities related to speeding, vehicle condition, overloading and other critical offences.

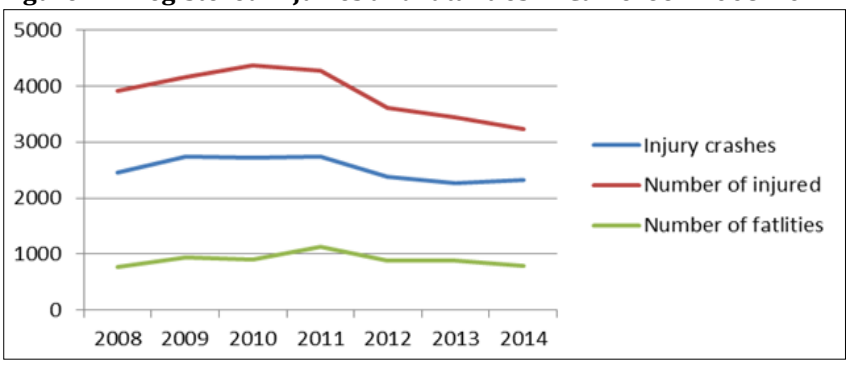
The Department of Transport has published national transport statistics and these reveal that Cameroon has some 673,895 registered vehicles in 2014, the majority of these (nearly 77%) being petrol driven (Transtat, 2014). Car ownership is estimated at between 6 and 7 per 1,000 population which equates to between 135,000 and 156,000 cars.

10.2 Road Safety Performance

Overall performance, registration rate mortality estimates

Figure 14 shows the number of injury crashes, injuries and fatalities as registered by the authorities in Cameroon and reported by the World Bank Country Office (Sidiki Sidibe). These data reveal a decrease in the number of injury crashes (from 3,458 in 2000 to 2,954 in 2013). Based on the registered data the trend for all injury types and crashes appears downwards.

Figure 14: Registered injuries and fatalities in Cameroon 2008-2014



Source: Sidiki Sidibe

However, given recent discussions with the authorities in Cameroon, and a recent analysis of the official data, it is apparent that there is significant evidence of under reporting of crashes, under recording of crashes, a lack of uniformity and interpretation of the definitions of the various injury categories and generally poor quality of registered crash data. The World Health Organisation's report on Global Road safety (World Health Organisation, 2015) estimates that there were 6,136 road deaths in Cameroon in 2013, this compared to the 1,128 reported by the police and as shown in Figure 14.

Compared to WHO data this number is underestimated by a factor of 5.3 resulting in an actual mortality rate of 27.6 per 100,000 population, putting Cameroon among the worst performing countries internationally when it comes to road safety. Furthermore, the country scores relatively poorly with respect to the aspects outlined by the five road safety pillars of the United Nations Decade for Action for Road Safety 2011-2020 (United Nations, 2011). The WHO assessment suggests that Cameroon faces significant challenges if it is to meet the fatality targets reductions it has set itself. One aspect that rates particularly poorly is enforcement of various road user behaviours and this, together with an estimated low rate of crash registration, could be indicative of the relatively low level of priority given to road safety.

In Cameroon information on road crashes can be obtained from the National Gendarmerie, the National Police, the Ministry of Public Health and the Ministry of Transport. The Gendarmerie and the National Police are responsible for crash data recording and capturing. The hospitals record their own data on crash patients treated in trauma and emergency centres in hospitals. There is no link between the police and hospital registration systems.

It can be stated that the country currently does not have reliable databases on traffic crashes. Furthermore, the existing systems are not administered centrally nor are they accessible via a road crash information system. As mentioned above, each organisation involved in road safety management collects and administers crash data via their own system. This produces a lack of consistency in the data processing and undermines the goal of identifying real needs and defining solutions. It should however be mentioned that the Ministry of Public Works, through the World Bank and in close consultation with the Ministry of Transport, Gendarmerie, National

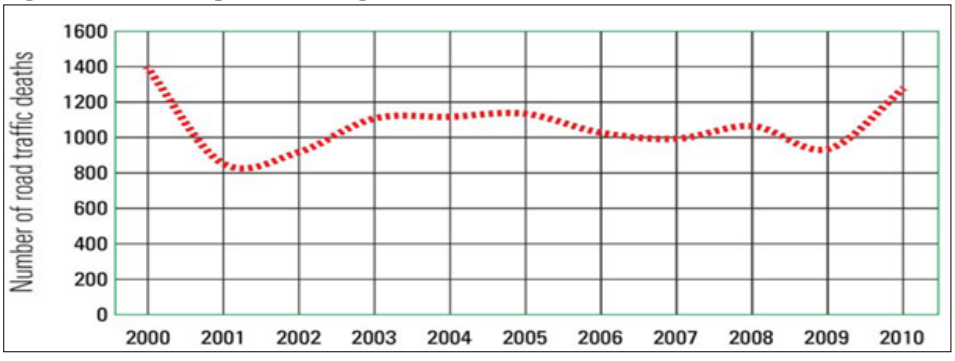
Police and Ministry of Health, has commissioned a consortium led by the University of Rome, to establish a new crash reporting and recording system in the country. This includes the supply of supporting hardware and software, training, support, etc. The system is expected to be fully commissioned by 2018.

Registered fatalities and injuries, historical development

The number of police recorded crash reports in Cameroon are not a stable time series. This is the result of varying reporting and recording rates, both by the National Police and Gendarmerie. It is also known that crashes involving motorcyclists (especially taxis) are seldom reported, primarily because the majority of these operators are not insured and do not comply with legal requirements to operate as a taxi. Crashes involving pedestrians and cyclists are reputedly also under-reported adding to the degree of under-registration. Furthermore, the number of recorded fatalities are based on persons killed within 7 days from a road accident occurring. This definition of a traffic fatality differs from the WHO norm of 30 days. The most recent WHO report on road safety (World Health Organisation, 2015) estimates the number of road deaths in Cameroon to be between 5 035 and 7 236 in 2013. Given the population and income levels, this number is in agreement with what can be expected from the general relation between per capita GNP and mortality.

Historic data (National Transit Bureau) reveal that the number of registered road traffic deaths fluctuates around the 1100 fatalities per year with some peaks and valleys including a sharp increase in 2010 (Luca Persia et al., 2015). The registration rate and influence thereof is unknown, but likely to be at most 20% given the WHO estimates.

Figure 15: Development of registered traffic fatalities



Source: National Transit Bureau, 2010

High risk categories and prevalent crash types

A set of crash data covering the period 2008 to 2016 were made available to SWOV for analysis as part of the new crash registration system project led by the University of Rome. Unfortunately these data are incomplete and it is unknown what proportion of crashes have been reported and recorded in this dataset. The data show that records for 2008 and 2009 are the most complete but after that the recorded crash numbers are a fraction of what is estimated by the WHO and significantly less than reported by the Ministry of Transport (see Figure 14).

Based on the results of a recent preliminary analysis of the road safety situation in Cameroon based on police reported crash data (Luca Persia et al., 2015), the main reported causes of road accidents were identified to be:

- Poor road user behaviour (70%).
- Mechanical failure due to ageing vehicles (about 20%).
- Poor road infrastructure (around 10%).

This study revealed that the role of human factors (HF) in crash occurrence revealed some recurrent risk factors, including:

- Speeding;
- The consumption of alcohol and drugs;
- Overloading of vehicles, especially motorcycles (this excludes the activities of transport resulting from port cargo);
- Non-use of helmets by drivers and passengers of two-wheel vehicles.
- Non-use of seat belts in urban (town) areas

By specifically analysing accidents involving vulnerable road users, such as pedestrians, cyclists and motorcyclists, the causes can be allocated to:

- The lack of adequate infrastructure (pedestrian crossings, lighting, subways, overpasses, and taxi stand areas, rest areas etc.).
- Risky behaviours of pedestrians (e.g., illegal crossing, walking on the roads etc.).
- Inconsiderate drivers and interaction with pedestrians
- Mixed function of road and mix of types of road users on the same roadway (e.g., truck, motorcycle, bicycle, pedestrian, bus on the Corridor Douala Yaounde Ndjamena)
- The illegal and non-designated use of the roadway and pavement/verges (e.g. due to illegal parking; hawker trading activities, etc.).
- Inadequate driving skills.
- Inadequate road signs and markings and poor driver discipline.

Over the 8 year period more than 20,000 crashes have been recorded by the police and these reveal that human factors (HF) are judged to play a significant role in crashes. In only 12% of all the records (and representing 1004 fatalities), HF variables were scored as not having played a role in the crashes or the role was unknown. Although human factors are, in general, interesting to know, they are based on the judgement of the persons completing the crash report and generally are subjective in nature and therefore unreliable for drawing firm conclusions. They are difficult to observe (especially when the driver is killed), and it should be questioned whether extensive efforts to improve the use and correct entry of these variables is the most effective way to improve the database quality and usefulness.

There are almost no records where these variables were scored unknown (*non renseigne),* although it is known that these variables are difficult to observe. Due to the complexity of accurately assigning HF related factors to crashes, this relatively high completion rate suggests

that probably ***no*** (non) is filled in whereas it may have been more accurate to fill in "Unknown" (*non renseigne)*. This is an important distinction.

Records with a ***yes*** for one or more of these variables are presented in Table 22, together with the proportion of the total that scored ***yes***. It is evident from these results that in some crashes more than one HF has been assigned since the total of records with a ***yes*** recorded for HF is higher than the number of records (the "Signalements" data file contains records of 20156 crashes and there are 27348 ***yes*** HFs recorded). The majority of the records, however, have been assigned other human factors (*autres causes humaines)*, which is not very informative. This could suggest that in the majority of the cases this variable is ticked, and all others are ***no*** by default. If that is the case, the meaning of the ***no*** for all other values is not meaningful.

Table 22: Number of records with a yes for any of the human factor variables

Human Factor Descriptor	Yes Records	Yes Rate
Professional error (*defautdemetrise)*	3,517	17.4%
Dangerous overtaking *(depassements dangereux)*	593	2.9%
High speed *(excesvitesse)*	3,768	18.7%
Fatigue	88	0.4%
Inattention	6,167	30.6%
Drink-driving *(ivresse du conducteur)*	179	0.9%
Dangerous manoeuvre *(mouvement dangereux)*	438	2.2%
Overloading *(surcharge)*	107	0.5%
Dangerous parking *(stationnementDangereux)*	129	0.6%
Caused by pedestrian *(cause par pieton)*	653	3.2%
Impaired driving by medicine or drugs *(medicament ou drogue)*	4	0.0%
Other (autre cause humaine)	11,705	58.1%

Table 22 reveals that while for the majority of the crashes a human factor is supposed to be an important factor, in 58.1% of these cases this factor is "other". This suggests that, as the actual factor was not specified, it was not observed.

10.3 Road Safety Management

A primary function in road safety management is a strong focus on results, in other words, setting of ambitious but realistic targets for road safety. These are not only in terms of targets for crashes and related injuries, but also relate to aspects such as critical offences, levels of investment, economic impacts, capacity, enforcement and any other aspects important for a country to achieve improvements. Based on recent discussions with stakeholders and a review of supporting documentation, there is little evidence to support a strong results focus in Cameroon.

Road safety has recently become a national priority in Cameroon with strong political support and a national sense of urgency from both public, private and civil society to redress the growing

road safety problems. Similar to many African countries, Cameroon is signatory to the Moscow declaration of the UN Decade of Action although it has not as yet managed to formally establish a lead agency responsible for road safety management. Furthermore, the country has no current road safety strategy in place as a follow up to the last strategy covering the period 2009-2014 (Ministry of Transport, 2008). According to personal communications with politicians and senior government officials, the development of a new road safety strategy is in the process of being commissioned. The new strategy will be aligned this with ambitions of the UN Decade of Action and express the intent of the government and civil society to redress the most pressing road safety issues. A primary goal is the establishment of an agency responsible for road safety management.

At the present time the responsibility for "Road Safety Management" (RSM) in Cameroon falls under the Ministry of Transport who can be viewed as the "Lead Organization" (main entity coordinating road safety activities). The RSM activities are funded through the national budget and the Road Fund. Until 2013 the Road Fund dedicated 1.5% of its budget to road safety, specifically in support of coordination activities, campaigns, education and to some extent equipment for enforcement. Since 2014 the allocation from the Road Fund has been increased to 4% indicating a growing commitment from government to redress ongoing and growing road safety problems, Although there appears to growing support for addressing the road safety problems, the country cannot be considered to be effectively managing the situation. Recent discussions with various senior government officials and persons representing civil organisations revealed that there is a general lack of co-ordination regarding road safety with each involved organisation and stakeholder following its own initiatives. At a national level, Road Safety Management has been deemed ineffective (Luca Persia et al., 2015). It does not comply with best practices internationally especially as far as the coordination function is concerned. There appears to be a general lack of co-ordination within government structures but also between responsible government departments and the private sector, particularly the Coalition of Cameroonian road safety NGO's (amalgamated in COALIROUTE) and the insurance sector (amalgamated in Pool TPV). Although a number of national committees have been established to fulfil the function of co-ordination, these have been largely ineffectual.

Regarding the management of traffic crash data, the current data collection system involving the Ministry of Transport, the National Gendarmerie, the National Police and the Ministry of Public Health, is decentralised with each Administration having its own system of data collection, with its limitations and errors. This is not effective and coordination between the administrations is poor. This results in an inability to use data coherently and creates difficulties in identifying aspects that are essential for effective road safety management (identifying problems and defining the appropriate response measures).

The funding of Road Safety Management is predominantly via the "Road Fund" (Etablissement Public Administration) and falls under the protection of the Minister of Finance and Minister of Transport (responsible for roads but not land transport). The funds are specifically designated for:

- Protection Programs of the National Road Heritage;
- Programs for prevention and road safety;
- Road Management Programs;
- Recovery operations and organisation of the streets.

In addition to the Road Fund, there are funds for dedicated road safety improvement projects, generally as part of major rehabilitation projects. Also organisations such as the Gendarmerie and Police have resources dedicated to road safety, particularly aimed at enforcement of critical offences and traffic management. NGO's dedicated to road safety (such as SECUROUTE) secure funding from external sources and apply these to road safety projects aimed at increasing road safety awareness through campaigns and training at all levels of society (primary schools to adults).

There is some consensus that the legal framework intended to support effective road safety management is inadequate. Certain sectors of the transport industry, namely transport operators, taxis (and especially motorcycle taxis), driver training schools, roadworthy centres etc. are not well regulated and the permitting and licensing systems (drivers and vehicles) cannot be effectively administered or enforced. Ineffective controls and management systems are open to corruption and maladministration.

The management functions relating to monitoring, evaluation, research are essentially ad-hoc functions within the current structure with no specific party have an assigned responsibility. The Ministry of Public Works, through its National High School of Public Works, has some indirect programmes related to supporting research into specifically the economic costs of road safety. However, as yet there is no structural place for these functions. A key problem related to this is the lack of adequate supporting road safety data. Furthermore, there is a clear need to develop capacity to support these functions. In the area of road safety data management, initial programmes will be based on collaboration with the crash data project being led by the University of Rome. These will facilitate technology transfer and capacity building with respect to monitoring and evaluation and will aim to also ensure the sustainability of the future road crash data centre.

Promotion is another function which appears to be largely an ad-hoc activity with each department and is restricted to programmes aimed at the general public. To a large extent promotion seems to be a core task of organisations such as Coaliroute and Pool TPV and Safe Right of Way (coalition of private enterprises) and a secondary task of the government departments with little or no co-ordination between the organisations.

Road safety strategy

The most recent strategy dealing with road safety is the nationally adopted strategy "Development of a National Strategy for road safety" (Elaboration d'une Stratégie Nationale de Prévention et de Sécurité Routières) which set out an action plan for the period 2009-2014.

The strategy focussed on the following:

- A thorough evaluation of road safety activities conducted since 1994;
- Developing a diagnosis of the current road safety situation;
- An analysis of traffic accident data and costing of accidents;
- The development of a 5-year action plan, including evaluating the implementation plan and assessing the success of it;
- The development of proposals to secure funding and funding sources for road safety.

As mentioned earlier, a new strategic plan covering the period from 2015 has not yet been developed but is under consideration.

Implementation success

The Ministry of Transport has implemented a number of reforms aimed at improving the management and security of transport related permits, licences and documents, some of which are still being finalised. The main reforms include the following:

- Reorganisation of the driver licence examination system;
- Computerisation of driver licenses;
- Introducing a license penalty points system for drivers (this has still not yet come into effect);
- Compulsory roadworthy testing for vehicles;
- Computerised permits for taxi drivers;
- Creation of technical vehicle control centres.

Furthermore, the authorities in Cameroon are addressing the growing problem related to road user behaviour, particularly those related to infringements of traffic laws and related to critical offences. The National Gendarmerie (responsible for enforcement of roads primarily outside the urban areas) has initiated the 85 week "Operation control surveillance-repression" programme with particular emphasis on the enforcement of:

- Speed limits;
- The use of seat belts;
- Drink driving and drugs;
- The technical control of vehicles.

The Gendarmerie has intensified its enforcement of critical offences since 2011 and has established a database (with the support of the EU) with which the programme is monitored and adapted. The results of intensified enforcement and high visibility on specific strategic transport corridors (such as between Yaoundé and Douala) has been demonstrated in reduced infringements and crashes.

The controls on urban roads appear to be less effective than those in interurban areas, especially with respect to offences such as driving without a seatbelt and using mobile phones while driving. The National Police, unlike the Gendarmerie, have no dedicated programme targeting critical offences and where enforcement is carried out, it is ad hoc (request from local authorities) and based on local knowledge. There are no targets set to manage critical offences

nor are enforcement rates monitored and managed, Police officers appear to indulge certain risky traffic behaviours and display a degree of preferential treatment of certain (types of) drivers.

10.4 Roads and Mobility

The total road network in Cameroon comprises about 230,000 km of road. The rural network is estimated to comprise some 50,000 km of registered road. The main network (which represents approximately 80% of the total) is composed of 4,300 km of paved roads, 11,600 km of classified roads and 12,338 km of rural roads (Luca Persia et al., 2015).

The paved roads and the gravel roads are poorly maintained, poorly signposted and generally have exceeded the usable design life. The untarred rural roads in Cameroon contribute to crashes that are related to the dry and wet season. During the dry season, road users grapple with excessive dust which causes visibility problems. In the rainy season road users are sometimes forced to use the wrong half of the road because of mud or potholes (CONSIA Consultants, 2013; OSAC Country Council Information, 2014a). During the rainy season, many gravel roads are not passable by most vehicles.

Pedestrians and livestock share the same roads as motorised vehicles resulting in constant conflicts and hazards, especially at night. Large logging trucks, as well as other vehicles, use the roads after dark and often these vehicles travel without lights and are frequently broken on the side of the road or even on the road. Together with a lack of road signing and lighting, these conditions make roads in Cameroon dangerous at night.

Like most other central African countries, motorised traffic not only increases during festive and seasonal periods but also over long weekends where city workers return to their homes in the more rural areas. According to the Bafia Mobile Gendarmerie Road Safety Unit, road traffic volumes increase especially during August and December, as do the number of road crashes.

The Department of Public Works has embarked on an extensive programme to rehabilitate the primary transport corridors linking Cameroon to other countries in the CEMAC region and also on key strategic internal routes. As part of the CEMAC corridor road safety improvement project strategic assessments and evaluations (including traffic and safety) have been carried out and the rehabilitation programme is expected to commence in 2017 and be ready in time for the Africa Cup of Nations (Afcon) football tournament to be hosted by Cameroon in 2019. On some corridors (e.g. Youande-Doula) preparatory work has already started. The works are to be funded by Cameroon and her CEMAC partners and will be undertaken as Build-Operate-Transfer (public-private partnerships) concession agreements built around very specific and SMART (Specific; Measurable; Assignable; Realistic and Time-related) service level agreements aimed at ensuring optimally safe operation of these vital transport corridors.

A number of express routes, routes linking vital major urban centres, are also under development including high quality transport links to the Port of Kribi and high quality links between Edea and Bafoussam and between Douala and Limbe.

According to the Ministry of Public Works there is also a new network development programme being developed and in which specific attention is to be given to the expansion of weighbridges to control the ongoing and severe problems being caused by overloading of especially cross-border traffic. It is anticipated that overload control will form part of the concession agreements although issues surrounding the privatisation of this function has yet to be resolved.

10.5 Vehicles

Making certain safety features compulsory to vehicles using the road network, lobbying manufacturers to provide standard safety features, prohibiting certain vehicles, campaigning among potential buyers to buy vehicles with higher safety ratings etc. are all actions that are supportive of the concept of safer vehicles.

Cameroon has no vehicle industry of its own and its vehicle standards, including safety standards are strongly dictated by terms and conditions set out in various CEMAC agreements. The country has no standards authority that focusses on standards for vehicles but MATGENIE (a company of government) is in charge of approval of the standards of new vehicles in Cameroon. The import of vehicles older than 10 years is not permitted although there are apparent means by which unscrupulous importers are managing to circumvent this restriction. There are 25 vehicle control centres all over the country.

Vehicle population

Table 23 shows the composition of the fleet of vehicles operating in Cameroon in 2012. Figures from the latest national statistics (Transtat, 2014), reveal that the total vehicle population has grown to 674,246 vehicles in 2014.

Table 23: Vehicle fleet size in 2012

Vehicle type	Number of registered vehicles
Bus and coach	44,87
Truck	10,144
Logging truck	9
Minibus	5,539
Motorcycle	224,989
Pickup	20,481
Trailer	67
Semi-trailer	3,033
Tractor (Agriculture)	163
Tractor truck (Horse)	3,656
Scooter	3
Private vehicle (cars)	169,234
Other	1,213
Total	**443,018**

Source: Luca Persia et al., 2015.

As mentioned earlier motorcycles are a significant mode of road transport in the country. These are both used for private transport and for commuter transport especially in cities to quickly transport people to their destinations. The average age of vehicles in Cameroon is a serious concern with almost a quarter of the vehicles on the roads older than 20 years old and nearly half the population older than 10 years, as illustrated in Table 24.

Table 24: Average age of vehicle population (2014)

Average age	Vehicle population (2014)
Other	593
< 1 year	19,793
1-5 years	250,213
5-10 years	88,561
10-15 years	61,897
15-20 years	95,524
>20 years	157,665
Total	**674,246**

Source: Transtat, 2014

Vehicle standards and roadworthiness

Although the country does not have rigorous vehicle standards and technical requirements, vehicles are issued with roadworthiness certificates upon purchase, often issued by the manufacturer or dealer. There are no stringent requirements for periodic inspections so the majority of vehicles on the roads no longer comply with the original safety standards and many are in poor condition. By law taxis are supposed to be checked every 3 months, cars every year, trucks and buses every 6 months although the control of this is not evident. The periodic inspection of motor vehicles is the responsibility of private roadworthy centres throughout the country. However, these appear to be ineffectual given the substantive evidence of non-roadworthy vehicles on the roads. Vehicles are supposed to comply with minimum technical requirements but this is not administered effectively. The (roadside and other) checks that are carried out may find defects but cannot revoke a vehicle license whereby a vehicle may no longer use public roads. Vehicle registrations are renewable on a 10-year basis and this is a formality without stringent controls to ensure that the vehicle is fit for use.

A growing problem is the number of illegal taxis, specifically the use of the motorcycle taxis which in the urban areas of Cameroun are used to cheaply transport three (and sometimes more) passengers at a time. These motorcycles are not fit for purpose and, apart from being a high risk transport mode, are seldom roadworthy and driven by drivers that are unqualified. Taxis in the urban area are also a high risk mode. In Cameroon, taxis are typically small sedans suitable for a maximum of 5 occupants. These vehicles are however used to transport larger numbers (irrespective that there are inadequate seatbelts and they are overloaded). Generally these vehicles are far from roadworthy, driving without tail-and headlights, bald tyres and held together with wire. Police in the urban areas turn an apparent blind eye to the potential danger posed by these vehicles, both to passengers and other road users.

10.6 Road Users

In Cameroon, males are at an increased risk of road traffic accidents compared to females (Jolion McGreevy et al., 2014). According to the same source, drinking and driving are a major problem after dark. Social activities and several religious activities take place in the weekend leading to increased traffic volumes and a higher risk for (fatal) crashes. Most youths have limited driving experience and in the weekends they often drive at night and can be drunk while driving. Commercial drivers often disregard traffic safety and the general traffic rules when they try to recoup weekend expenses and therefore overload with passengers and increase their speed to complete more trips.

Human error such as fatigue, lack of skill, drunkenness, speeding and carelessness are major factors for traffic crashes (Dominguez-Torres & Foster, 2011). There is an evident need for public awareness of traffic and safe driving. Thus, the government of Cameroon has launched intense road safety campaigns, strengthened enforcement strategies, driving school standardisation programs and introduced medical exams for commercial drivers (CONSIA Consultants, 2013).

Driving licences

A large proportion of (motorcycle) drivers are not legally licensed to operate vehicles. Many drivers of motorcycle taxis have illegal driving licences. In 2005 it was estimated that approximately 22% of motorcycle taxi drivers did not have a valid driving license.

Furthermore, the country has many driving schools that do not meet the standards set by national laws. In 2015, a survey published by the Ministry Transport revealed that less than 30% of vehicles used by driving schools complied with the regulations. The number of issued drivers licences appears to be increasing with 86 820 driving licenses issued in 2008 and 136,605 in 2013. Young adults (26-30 years) form the group with the highest number of licenses. Of these, the majority are males (87.8%).

10.7 Roads

The total road network in Cameroon comprises about 230,000 km of road. The rural network is estimated to comprise some 50,000 km of registered road. The main network (which represents approximately 80% of the total) is composed of 4,300 km of paved roads, 11,600 km of classified roads and 12,338 km of rural roads (Luca Persia et al., 2015).

The paved roads and the gravel roads are poorly maintained, poorly signposted and generally have exceeded the usable design life. The untarred rural roads in Cameroon contribute to crashes that are related to the dry and wet season. During the dry season, road users grapple with excessive dust which causes visibility problems. In the rainy season road users are sometimes forced to use the wrong half of the road because of mud or potholes (CONSIA Consultants, 2013; OSAC Country Council Information, 2014a). During the rainy season, many gravel roads are not passable by most vehicles.

Pedestrians and livestock share the same roads as motorised vehicles resulting in constant conflicts and hazards, especially at night. Large logging trucks, as well as other vehicles, use the roads after dark and often these vehicles travel without lights and are frequently broken on the side of the road or even on the road. Together with a lack of road signing and lighting, these conditions make roads in Cameroon dangerous at night.

Like most other central African countries, motorised traffic not only increases during festive and seasonal periods but also over long weekends where city workers return to their homes in the more rural areas. According to the Bafia Mobile Gendarmerie Road Safety Unit, road traffic volumes increase especially during August and December (back to school and year end festivities), as do the number of road crashes.

The Department of Public Works has embarked on an extensive programme to rehabilitate the primary transport corridors linking Cameroon to other countries in the CEMAC region and also on key strategic internal routes. As part of the CEMAC corridor road safety improvement project strategic assessments and evaluations (including traffic and safety) have been carried out and the rehabilitation programme is expected to commence in 2017 and be ready in time for the Women Africa Cup of Nations (Afcon) football tournament to be hosted by Cameroon in 2016. On some corridors (e.g. Yaoundé-Douala national 4 highway) preparatory work has already started. The works are to be funded by Cameroon and her CEMAC partners.

In line with the Mens' Africa Cup of Nations (CAN 2019) football tournament to be hosted by Cameroon in 2019, an express routes will be built from Yaounde to Douala. The second step of this espress routes Edéa -Douala will be undertaken as Build-Operate-Transfer (public-private partnerships) concession agreements built around very specific and SMART (Specific; Measurable; Assignable; Realistic and Time-related) service level agreements aimed at ensuring optimally safe operation of these vital transport corridors.

A number of express routes, routes linking vital major urban centres, are also under development including high quality transport links to the Port of Kribi and high quality links between Edea and Bafoussam and between Douala and Limbe.

According to the Ministry of Public Works there is also a new network development programme being developed and in which specific attention is to be given to the expansion of weighbridges to control the ongoing and severe problems being caused by overloading of especially cross-border traffic. It is anticipated that overload control will form part of the concession agreements although issues surrounding the privatisation of this function has yet to be resolved.

10.8 Post-crash Response

The time between injury and initial stabilisation is an important factor in the patient's survival (the so called golden hour). Prompt emergency assistance and efficient trauma care management are clearly important in minimising the injury consequences resulting from crashes. Cameroon does have multiple emergency telephone numbers but lacks emergency

room injury surveillance systems (OSAC Country Council Information, 2014). The country has limited resources to deal with road crash victims. There are no dedicated trauma teams for road crashes and these are treated as any other emergency patients in hospitals which are equipped with emergency care or special trauma units. Not all hospitals have these facilities nor do all ambulance services have specialised and trained trauma team personnel.

An emergency centre (with its own emergency call number) has been established in Yaounde and is the only specialised emergency centre in the country equipped to deal with trauma patients. However, even this centre has inadequate specialised trauma resource capacity to deal with the large numbers of traffic crash victims and the geographic area affected by crashes. In the last year the centre dealt with 8226 trauma cases, 41% of which were victims of road crashes. The majority of victims were males aged 21-40 years old. Injuries are typically lower limbs injuries (40%), chest injuries (28%) and head injuries (16%). The majority of injuries (60%) are related to fractures and lacerations. Many of the victims are reputedly either pedestrians or passengers/drivers of motorcycle taxis.

According to the centre a major problem in admitting patients is the lack of personal identification and proof of insurance. Patients may not be admitted unless there is some surety regarding the payment of treatment. In many cases this cannot be established and since medical insurance is not compulsory, is not possible to immediately admit all patients. This results in average admission times of 9 – 16 hours and in extreme cases up to 72h. Prior to admission, patients are afforded basic emergency care.

There are no records of response times following a call to a crash. The Emergency Centre has only two ambulances and given this limited resource, response times cannot be guaranteed and are not monitored.

Reports of road crashes are channelled mainly through several informal and unstructured media. Currently, only one toll free emergency line is designated for crash/incident reporting. Government has created a National Committee to follow up road crash victims but this is still not operational.

10.9 Data Collection and Accident Reporting

Currently Cameroon has no reliable database on road traffic crashes and there is no centralised information system containing data on road crashes, victims and the road environment. Each organisation dealing with road crashes has developed their own registration system and each of these manage these data according to their own needs. There are obvious differences between the systems and all have certain shortcomings. Whether data on urban crashes is accessed via the National Police or the hospitals, the quality of the rough data is not reliable enough to use for road safety analyses. The current road safety performance statistics (outcomes) are primarily based on data centrally recorded by the National Gendarmerie on the intercity road network. However, also the National Police record crash data and are responsible for registering crashes in the urban areas of the country. The Police also record crash data via crash report

forms but these data reveal significant gaps and errors (e.g., omissions, misinterpretation of a choice, wrong choices, typing errors etc.). These crash databases are all incomplete and cannot be reliably used for time series analyses or the production of general road safety statistics required for road safety management purposes. The datasets do not comply with the requirements set for supporting a Safe Systems Approach to road safety management.

According to the report "Development of a National Strategy for Prevention and Road Safety", several studies have been conducted to establish a system for the collection and analysis of traffic crash data. These include:

- SNC / Lavalin (1998) on the establishment of a crash database;
- BETA CONSULT (2002) on road safety audit and the introduction of Bulletin of Traffic Accidents Analysis (BAAC), including software data processing;
- CERTES 2005 on the establishment of a system of collection and management of crash data for road safety improvement.

The Ministry of Transport (MINT) has also acquired computer equipment that can be used to treat crash data that is available to the Sub-Department of Prevention and Road safety (SDPSR). The accident analysis module (BAAC) has not yet been implemented also because the data collection system is not yet fully functional. Currently Cameroon does not have an operational road traffic crash database or management system.

Parties involved in crash data collection

In Cameroon, the main institutional sources of information on accidents traffic are:

- The Ministry of Transport (MINT);
- The Ministry of Public Works (MINTP)
- The Ministry of Public Health - National Observatory of Public Health (NPSO);
- The Gendarmerie Nationale;
- The National Police.

Other actors involved in the process are:

- The National Institute of Statistics;
- The Association of Cameroon Insurance Companies;
- The Road Safety Associations.

10.10 Conclusions and Recommendations

A primary function in road safety management is a strong focus on results, in other words, setting of ambitious but realistic targets for road safety. These are not only in terms of targets for crashes and related injuries, but also relate to aspects such as critical offences, levels of investment, economic impacts, capacity, enforcement and any other aspects important for a country to achieve improvements. There is little evidence to support a strong results focus in Cameroon.

Road safety has recently become a national priority in Cameroon with strong political support and a national sense of urgency from both the public and private sectors to redress the growing road safety problems. Similar to many African countries, Cameroon is signatory to the Moscow declaration of the UN Decade of Action although it has not as yet managed to formally establish a lead agency responsible for road safety management. Furthermore, the country has no current road safety strategy in place as a follow up to the last strategy covering the period 2009-2014. According to personal communications with politicians and senior government officials, the development of a new road safety strategy is in the process of being commissioned. The new strategy will be aligned this with ambitions of the UN Decade of Action and express the intent of the government and civil society to redress the most pressing road safety issues. A primary goal is the establishment of an agency responsible for road safety management.

Road safety management in Cameroon does not comply with the requirements of a Safe Systems Approach and rates as relatively poor when compared to the international state of the art. At a central government level there is little evidence of a results orientated approach to road safety management. There is a general lack of coordination and although there is a lead agency, it does not have the support of a reliable road traffic crash database with which to inform and develop relevant policies and strategies. Monitoring of performance targets does not take place and there is a general lack of accountability. The functions relating to funding, legislation, monitoring and evaluation, research and promotion are not a structural part of road safety management and appear to be the responsibility of one or more departments and/or ministries without any form of central co-ordination. Drivers, vehicles and roads are generally of low standard and a lack of enforcement and supporting road safety infrastructure, all contribute to a declining road safety situation. The country lacks adequate resources to remedy the current problems and skills are needed across all the pillars supporting a safe road system.

11 Case Study: Morocco

11.1 Introduction

Morocco has been selected as one of the case studies. Morocco covers an area of 710,850 km^2 and has a population approaching 32 million people, more than half of which live in the urban areas. The transport sector in Morocco provides some 7% of the GDP, contributes to 15% of State budget revenue, employs 6% of the labour force and consumes 40% of the national energy produced (EuroMed Transport Project, 2010).

The road network covers some 61,000 km, of which 41,105 km are asphalt surfaced (tarred). Of the asphalt roads 9,816 km are categorised highways, 9,221 km as regional roads and 22,068 km as provincial roads (Ministere de L'Equipement et du Transport, 2012). Of the highways some 800 km are dual carriageways, i.e. freeways or motorways (EuroMed Transport Project, 2010).

The road network accommodates some 90% of the countries mobility needs and 75% of the transport of goods needs. Approximately 50 million vehicle-km are travelled on the paved network on a daily basis, i.e. 67% on highways; 18% on regional roads and 14% on provincial roads (EuroMed Transport Project, 2010).

Currently there are different estimates of the vehicle population in Morocco. These vary from 2.5 million registered vehicles (EuroMed Transport Project, 2010)(1,825 million private cars, including LDV) and the rest commercial vehicles (buses and trucks)) to 3.5 million (CNPAC, 2013). Of course the variation in these figures is partly due to the different years of the estimates: the 3.5 million figure concerns a 3/4 year later estimate than the 2.5 million figure. The latest WHO estimates reveal a vehicle population of 2,710,000 of which 1,976,172 are cars and 707,797 are buses and trucks (World Health Organisation, 2013). The vehicle fleet is relatively old with some 75% of the fleet being 10 years and older.

11.2 Road Safety Performance

Overall performance and mortality

In 2012 4,167 fatalities resulting from road traffic crashes were registered in Morocco (Ministere de L'Equipement et du Transport, 2012). In addition 12,251 persons were seriously injured and a further 90099 sustained minor injuries. The registration rate is unknown at this stage and it is possible that the actual number of persons injured in crashes is higher than reported from the registered crashes as is evident from the latest WHO data.

According to the 2015 WHO figures (which uses the same official Moroccan data source) which report fatalities for 2013, some 3,832 people were registered as killed in traffic crashes (World Health Organisation, 2015). The WHO estimates that these figures are significantly lower than the actual number of fatalities. Given under reporting and limited controlling between different crash data systems and records, the WHO has developed a methodology to estimate the actual number based on reported and recorded data. The WHO estimates the actual number of

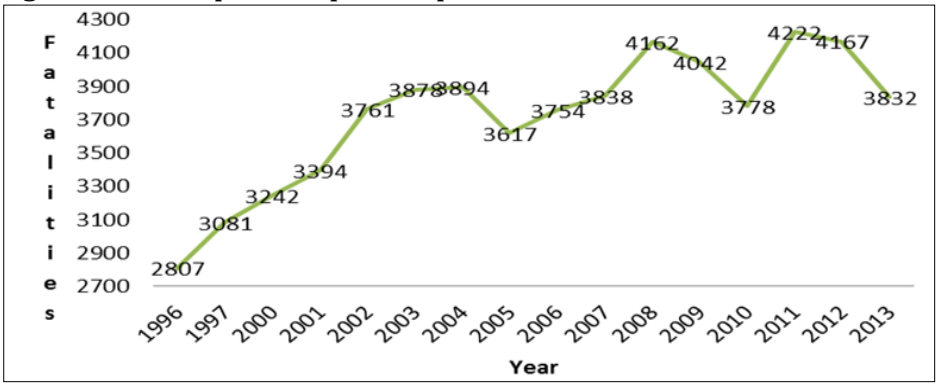
fatalities in Morocco to be closer to 5,700 in 2010 and 6,870 in 2013, implying that nearly half of the estimated number of actual traffic fatalities is not recorded in the current system. Using these WHO estimates, a mortality rate of 18 (2010) and 20,8 (2013) deaths/100,000 population has been calculated. Although this is lower than the average for the eastern Mediterranean region, it is significantly higher than that of countries in for instance the European region (generally less than 10/100,000). However, assuming that the registered numbers reported by the Moroccan authorities are 100% correct then the mortality rate would be between 12 and 13 traffic fatalities/100,000 population.

The largest proportion of crash fatalities are occupants of cars and light vehicles (37%) followed by pedestrians (27%) and riders of motorised two and three wheelers (20%). The majority of fatalities and seriously injured victims occur on rural roads (upward of 70%). More than 80% of the victims are males.

Registered fatalities and injuries, historical development

Over the period 2003 – 2012 registered road crashes increased from 53,814 to 67,151, an increase of 25% (Ministere de L'Equipement et du Transport, 2012). Over the same period the number of fatalities has increased from 3,878 to 4167, an increase of 7.5%. In 2013 the number declined to 3832. The number of fatalities is not constant and the trend reveals fluctuations with sudden decreases in certain years (e.g. 2005; 2010 and 2013) followed by increases in following years (Figure 16). However, the overall crashes reveal a relatively constant increase of 1.5- 2% per year.

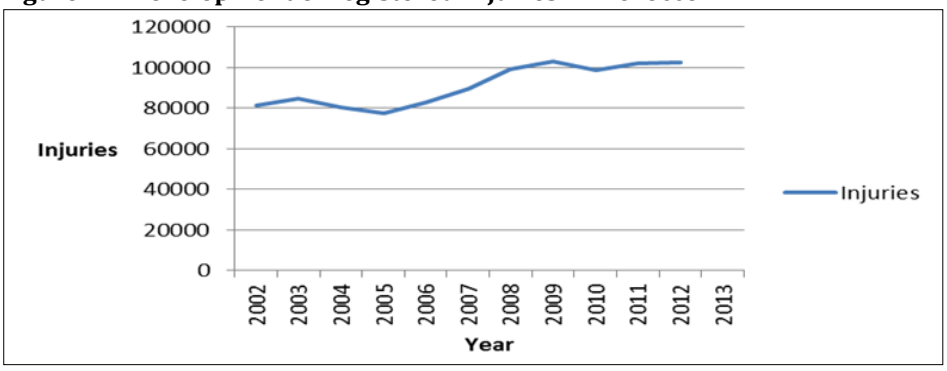
Figure 16: Development of police reported traffic fatalities in Morocco



Source: Ministere de L'Equipement et du Transport, 2012

The trend in the number of registered injuries in Morocco reveals a similar trend with the number increasing from 84522 in 2003 to 102350 in 2012 (Ministère de l'Equipement et du Transport, 2013), an increase of 21%. As with fatalities the trend is upward with little indication of reversal.

Figure 17: Development of registered injuries in Morocco



Source: Ministere de L'Equipement et du Transport, 2012

The registration rates over the years are not reported so it is unclear whether the quoted numbers have been corrected for the effect of under-registration.

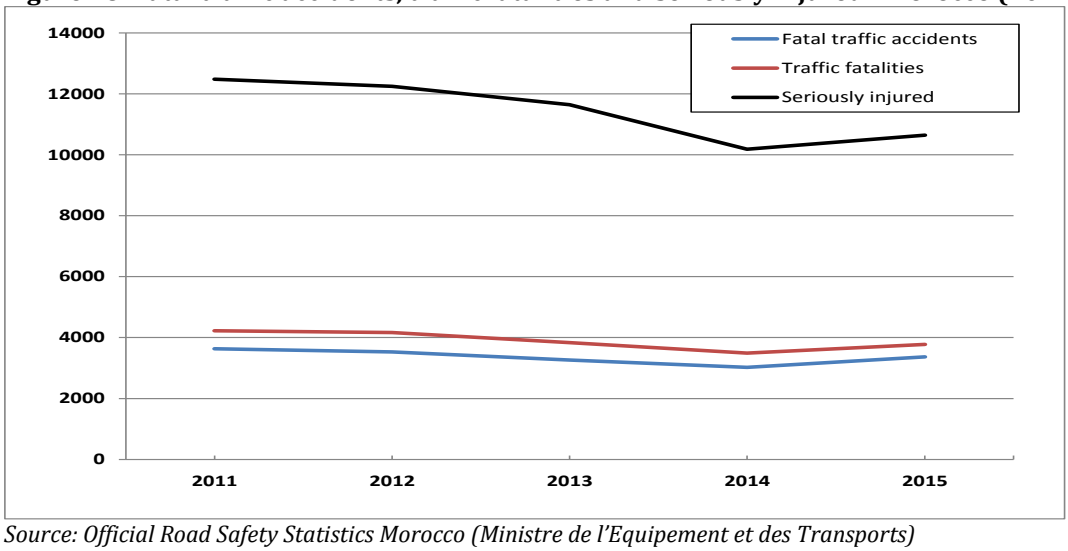
The development of serious road crashes over 2011–2015 is shown in Table 25 and Figure 18.

Table 25: Development of serious injury crashes

	2011	2012	2013	2014	2015
Road accidents	67,082	67,151	67,926	68,279	78,003
Fatal road accidents	3,636	3,531	3,265	3,021	3,365
Traffic fatalities	4,222	4,167	3,832	3,489	3,776
Seriously injured	12,482	12,251	11,641	10,185	10,647

Source: Official Road Safety Statistics Morocco (Ministre de l'Equipement et des Transports)

Figure 18: Fatal traffic accidents, traffic fatalities and seriously injured - Morocco (2011-15)



Source: Official Road Safety Statistics Morocco (Ministre de l'Equipement et des Transports)

It is evident from Figure 18 that the downward trend in road safety accidents and fatalities has not continued in 2015. It should be pointed out that the development of road safety crashes has not been corrected for the development in the number of road users and the vehicle park in Morocco. This would take a more refined statistical analysis that lies outside the scope of the present case study.

High risk categories and prevalent crash types

Passenger cars and motorcycles are the most common vehicles involved in crashes. Some 80% of crashes involving vehicles in rural areas involve a car of motorcycle. In urban areas some 88% of crashes involve cars or motorcycles (with nearly 34% of these being motorcycles). A concern is that is significant proportion (35%) of all vehicles involved in crashes is older than 15 years old. Some 27% of motorcycles involved in crashes are older than 9 years whereas some 57% of cars in crashes are this age. Even considering the rapid advancement of technology in the automotive sector this implies that many cars and motorcycles on Moroccan roads do not have the latest technology such as state-of-the-art occupant protection, ABS and ESP. Furthermore, although it is compulsory to wear seat belt both in front seats and back seats since 2005, it is not certain when it became compulsory for new vehicles to be fitted with rear seat belts or by which date all cars had to be (retro) fitted with rear seat belts.

Pedestrians are a particularly high risk group with more than 27% of those victims killed and more than 21% seriously injured in traffic crashes being pedestrians. Another high risk group are motorcyclists (20% of all fatalities and ca. 29% of all serious injuries). Considering that the modal share of these groups is usually relatively small this may imply that they are disproportionality represented in the number of serious injuries and fatalities.

11.3 Road Safety Management

Road safety

The overall responsibility for road transport rests with the Ministry of Equipment and Transport and Logistics (METL) which is responsible for the administration and regulation (legislation) of road transport.

Road safety management falls under the responsibility of the Inter-ministerial Committee on road safety (CISR) which is chaired by the Head of Government. Under the inter-ministerial committee is the Permanent Committee on road Safety (CPSR) which is headed by the Minister of Transport. Reporting to this committee are the Regional Committees (CRSR) headed by the governor (called the Wali) of each region. These road safety management bodies have been established by decree.

The Department of Road Transportation Safety (DTRSR) has the overall administrative responsibility for road traffic safety in the country and supports the above committees. CNPAC is responsible for road safety education and campaigns whereas road safety engineering and traffic law enforcement activities are spread across all departments with no apparent central

controlling department. Co-ordination of the road safety activities takes place in the earlier mentioned committees.

CNPAC is a leading road safety organisation in Morocco and because of its central role it is mentioned separately. The CNPAC is a public utility establishment in 1977. It is a legal entity, and placed under the technical control of the METL and under the financial authority of the Ministry of Economy and Finances. In order to improve road safety, CNPAC participates in studying and proposing, with the competent authorities, all intended measures to reduce the number of traffic accidents; in the education of the public and in putting materials at the disposal of the services in charge of road safety.

Road safety strategies

Following the growing road safety problems at the beginning of this century, the Moroccan Government, assisted by a Swedish Agency, developed a national road safety strategy whose objectives are assigned to reverse the upward trend in the annual number of fatalities and serious injuries, and reduce a sustained and continuous fatalities and serious injuries.

To implement this strategy, the government has developed three-year emergency Integrated Strategic Plans (PSIU), which integrates actions with immediate effect and value on improving road safety in Morocco. The first of these was the 2004 version (the strategy for 2003-2013) which sets the foundation for all later strategies.

The 2004 PSIU outlined an action plan directed at the following 7 **focus areas**:

1. Coordination and management of road safety at a high level;
2. Legislation;
3. Control and sanctions;
4. Driver training and reform of the license tests driving;
5. Road infrastructure and urban roads;
6. Relief provided to victims of traffic accidents (Emergency services); and
7. Communication and education.

The plan sets out an ambitious programme to undertake a number of steps and actions in each of these areas. Examples included the formation of various committees to better manage and co-ordinate road safety (Focus area 1); the revision of the road code and changes to legislation and laws (Focus area 2); additional equipment and improved coordination of enforcement activities (Focus area 3); adoption of a professional driver code for track and bus drivers (Focus area 4); develop and improve rural road standards and reduce black spots (Focus area 5); improving skills and training of emergency response personnel (Focus area 6) and to adopt and develop action plans and strategy implementation for communication at all levels of the population targeting specific actions in the other focus areas and achievement of objectives (Focus area 7).

PSIUI was followed up by PSIU II in 2008 (Ministry of Equipment and Transport, 2006) which covered the period 2008-2010. PSIUII reported the progress with regards to PSIUI

implementation and it was clear that significant progress was made by implementing actions and measures across all focus areas. For example, it is evident that the coordination and management structure proposed by the plan has been adopted and is currently functioning. Also changes were introduced to vehicle and driver testing and extensive communication and education campaigns were launched.

The third plan PSIU III, covering the period 2011-2013 (Standing Committee on Road Safety, 2010), seeks to support the decline in road safety indicators. It will be dedicated to the implementation of all the provisions of a new law (52-05) on the rules of the road, the implementation of tools, the acquisition of all equipment, building and human resources required and **adds two focus areas (focus areas 8 and 9)**, namely:

8. Promotion of road safety education at schools and;
9. Promotion of scientific research and technological monitoring of traffic and traffic safety.

PSIUII and PSIUIII indicate that the action plans implemented in PSIUI and PSIUII have had an impact on road crashes and more specifically on fatalities. This is especially evident in the period 2008- 2010 (Ministry of Equipment and Transport, 2006) and this decline is attributed to these interventions. However, the number of fatalities in 2011 increased to a level above that of 2008 and hence the downward trend appears temporary. Consequently a more sustainable approach to manage the problems seems necessary.

In 2013 the Ministry of Equipment, Transport and Logistics adopted the new outline for the period 2013-2016 which focused on the nine axes of PSIU III.

The PSIU-4 covers the period 2016-2025. Its ambitious target is to halve the number of traffic fatalities in 2015 and to achieve a 25% reduction in traffic fatalities in 2020. Expressed in numbers, the targets are to reduce the number of traffic fatalities to 2,800 or less in 2020 and to 1,900 or less in 2015. The contents of PSIU-4 were not yet available at the time of this report.

Besides the PSIU, which has a focus on change of driver behaviour through legislation, enforcement and education, further improvements in road safety are being planned by road improvement plans. The “programme spécial des aménagements de sécurité” (PSAS) covers the period 2014-2018. An important aim of this project is to improve safety of main highways by installing guard rails. Besides plans for improving highway safety, Morocco, also has plans for extending and improving the rural road network in the coming years (e.g. OITC, 2013)

The action plan for road safety 2013-2016 (“Orientations stratégiques 2013-2016”) lists short-term actions for 9 spearheads of policy:

1. Management and coordination of road safety at central level;
2. Further improvement in road safety legislation;
3. Further implementation and improvement of traffic enforcement;
4. Improvement of driver examination and licensing procedures for drivers and professional drivers;
5. Further improvement of road infrastructure;
6. Further improvement of emergency medical care;
7. Road safety communication and campaigns;
8. Road safety education at schools;
9. Promotion of scientific research and monitoring of traffic and traffic safety.

The Moroccan Government has decided to let the World Bank evaluate its road safety strategy for the period 2003-2013. Therefore, the Moroccan Government has, at this stage, developed only road safety 'orientations' for the period 2014-2016. These have yet to be formally adopted by the Inter-ministerial Committee of road safety (headed by the chairman of the Government); and could then form the basis of the next road safety strategy.

The PSIU-4 covers the period 2016-2025. Its ambitious target is to halve the number of traffic fatalities in 2015 and to achieve a 25% reduction in traffic fatalities in 2020. Expressed in numbers, the targets are to reduce the number of traffic fatalities to 2800 or less in 2020 and to 1900 or less in 2015. The contents of PSIU-4 were not yet available at the time of this report.

Besides the PSIU, which has a focus on change of driver behaviour through legislation, enforcement and education, further improvements in road safety are being planned by road improvement plans. The "programme spécial des aménagements de sécurité" (PSAS) covers the period 2014-2018. An important aim of this project is to improve safety of main highways by installing guard rails. Besides plans for improving highway safety, Morocco, also has plans for extending and improving the rural road network in the coming years (e.g. OITC, 2013)

International treaties and declarations

Morocco is signatory to the following international treaties and conventions regarding road transport and road safety and has adopted the following resolutions as a member of the United Nations (Source: UNECE-Transport):

- Road traffic
- Road signalling
- Convention on the contract for the International carriage of Goods by road (CMR) of 1956
- Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention) of 1959 and revised in 1975
- Transportation of dangerous goods (ADR)
- Transportation of perishables (ATP)
- Location and validity of driving licenses
- Temporary importation of private road vehicles
- Custom convention on container transport

- United Nations resolution 64/255 (Improving global road safety)
- The Moscow Declaration of 2009 - First Global Ministerial Conference on Road Safety: Time for Action
- CITA: common interest organisation in the field of road vehicle inspection.

Implementation success

As mentioned earlier the PSIU's have had a significant and positive impact on road safety management in Morocco. Various steering and co-ordinating committees have been formed and have taken responsibility of the road safety problems. These are generally chaired by high ranking officials and are backed by Government. Blackspot remedial programmes have been implemented and specific attention has been given to increase and improve communication and training among road users. Road infrastructure has improved as have controls and sanctions and supporting legislation as is described in the following sections.

Of particular note is the significant investment over the period 2011-2013 in which the Roads Directorate of the Ministry invested over 920 million Dirham in road safety infrastructure improvements.

Selected Institutional Management Functions

The "Direction des transport routiers et de la Securité Routière" (Department of Road Transportation Safety - DTRSR) is responsible for ensuring coordination between all partners in road safety. The DTRSR has the lead agency role for road traffic safety lies and they have a mandate to administer the road safety strategy and there is a separate national budget allocated to achieve this. However, there is no specific performance targets linked to this. The DTRSR must coordinate road safety matters with and between the "Direction des routes" (Department of Roads and Road Traffic), the Ministry of the Interior, the Ministry of Health, the Ministry of National Education and CNPAC.

CNPAC is responsible for the implementation of axes No. 7 and No. 9 of the road safety strategy in Morocco, respectively on communication and awareness and scientific research and technological intelligence., Evident from discussions with the Moroccan counterparts is the need to develop a better understanding on the Research and Development Pillar which supports the effective implementation and monitoring of the Moroccan road safety strategy. Specifically the following issues and topics are deemed relevant:

- Road safety management, particularly at the local level (municipalities, cities, provinces); this includes monitoring, assessment and evaluation activities, and the development and implementation of safety performance indicators (so-called SPI's);
- Enforcement: Surveillance, control for speed, and vehicle inspection. Currently the Ministry of Infrastructure, Transport and Logistics is responsible for vehicle registration through *centres immatriculateurs*, and it is the only organisation that maintains the database for vehicle registration.

In 2015, CNPAC had a budget of 125 million dirham for its program of road safety education and campaigns.

Since the introduction of PSIU I, Morocco has targeted a goal of an annual 5% reduction in fatal crashes. From the statistics it is evident that this target has not been met (especially if measured over the longer term). A number of policy reviews have been conducted but these show that the effect of implemented initiatives on (fatal) crashes is limited and certainly not sustained. Although a general strategic direction is evident, the goals are general in nature and therefore difficult to effectively monitor and evaluate, especially in terms of effect on the number of crashes.

Making any necessary adjustments to interventions and institutional outputs does not routinely take place at the present time. Annual road crash statistics are produced by the Department of Roads and Road Traffic but these are no more than general statistics and are not evaluations of policy directives or strategic initiatives. Investments into road safety are not routinely assessed in terms of their benefits nor is there a clear understanding of what the effects of the various road safety initiatives are.

Legislation governing road safety

Road safety is legislated under the 52-05 law.

The most important legislative changes affecting road safety were introduced through the adoption of the (January 17) 2005 decree related to traffic law enforcement which established:

- Compulsory wearing of seat belts (front and back) in all vehicles with a maximum loaded weight of 3.5 ton;
- Prohibits the use of hand held mobile phones during driving;
- Prohibits children less than 10 years old to sit in the front seats of passenger cars;
- Makes it compulsory for passenger transport vehicles with more than 15 seats and heavy goods vehicles with a carrying capacity exceeding 8 ton, to be equipped with at least ABS and decelerators and speed limiters.

Morocco also has laws governing the use of public roads (signing and rules of the road), the use of vehicles on public roads, driver licencing and testing, wearing of helmets in traffic and drink driving. In addition, a new Highway Code was adopted in October 2010 which introduced stricter controls and penalties for traffic offenders. The penalty points system was introduced in the new law and the possibility to imprison certain traffic offenders was introduced. The law facilitates the provision and use of automated speed enforcement camera's, new equipment and infrastructure for enforcement personnel etc. Although the Code brought about significant changes to road safety management and had a marked effect on road crashes and fatalities, the effect was short term and as a result some amendments have now been proposed to the code including making it possible to fine offending pedestrians and imprisoning the party guilty of a crash.

Morocco has about 100,000 civil associations which are active in various sectors of social and cultural welfare. In 2011, the constitutional law was changed to provide room for a larger involvement of these associations in the process of proposing and preparing legislation, including the legislation concerning road safety.

Monitoring and evaluation

Although there are various information systems in place in Morocco, these are in principle all stand-alone systems serving a specific purpose. For road safety management to be effective, a comprehensive information platform containing data relating to crashes, vehicles, drivers, enforcement and adjudication, traffic (speeds, volumes etc.) is required. Since monitoring is an essential component of a management system, these data need to be accurate, current and reliable. Many of these data are not readily available (e.g. at the Local authority level) and it is anticipated that initially such a system will be developed around data on the national (rural) road network. Since these data serve many end-users it may be logical to establish a central unit/agency responsible for data collection, validation and quality control. This would seem to logically fit in the activities of the Roads and Road Traffic Department.

The current data collection, analysis, validation and sharing mechanisms of road safety management information in Morocco are not optimal for effective management of crashes in the country. In most cases no performance based criteria have been set for potential road safety indicators but this could be due to the fact that benchmarks cannot be set because the data needed to set them are unavailable. Although there are state of the art registration systems these are not always linked with other systems and or have attempts to integrate these been explored. A detailed review of the systems may be required to identify opportunities for exploiting these data to improve road safety management and to facilitate target setting.

Research and development and knowledge transfer

Research, development and knowledge transfer on road safety matters take place on an ad-hoc basis in Morocco. In the particular area of post-crash response various scientific evaluations have been performed by medical universities (Mohammedia, 2010; Messnan, 2014; Mohammed, 2013; Rhidifa, 2013; Kandri Rody, 2015). A dedicated road safety research programme, backed by sustainable funding sources and carried out by dedicated research staff is currently not apparent. This project is an example of one which typifies capacity building and professional exchange but needs to be expanded to include all aspects of road safety. The feasibility of establishing a dedicated road safety research institute as an independent entity or as part of a future road safety agency needs to be further explored.

By far, cooperation between the different road safety stakeholders was mentioned as the key to improve road safety. The broad representation of Moroccan officials (DTRSR, CNEH, CNPAC, CNER, Police and Gendarme) was warmly welcomed. This cooperation is promising and should be maintained and expanded.

11.4 Roads and Mobility

The Roads and Road Traffic Department is responsible for the national, provincial and regional road network in Morocco. The Roads and Road Traffic Department applies various road design standards, which have been developed for local conditions. Originally based on international standards, these have been adjusted and tailored to fit the Moroccan situation. Road designs are subject to road safety audit (pre-opening) although this is not mandatory.
The following remarks can be made regarding roads and mobility:

- The road network has been classified. The question is how functional the classification is: i.e. is there synergy between the function, form and use of the roads, do the correct roads connect activity centres, does the traffic correctly use these roads and are these roads correctly designed for that use?
- There are procedures applied for the setting and posting of speed limits. However, the credibility of the speed limit is not a factor and this should be considered (Aarts et al., 2009);
- There is a network classification system in place and design standards applied to the various road classes. However, the classification systems is elaborate and consideration could be given to simplifying this to reduce the number of road categories (Dijkstra, 2011; Schermers & Vliet, 2001; Wegman & Aarts, 2006);
- Road maintenance programmes are in place and fed by regular inspections such as pavement condition assessments, visuals, quality of road signs and markings;
- Vulnerable road users and facilities for these are not very well provided for in the rural areas nor are there extensive guidelines covering these provisions in use. There is a new program (2014- 2018) named PSAS dedicated to the infrastructural safety of rural roads.

11.5 Vehicles

This aspect relates to the conditions under which vehicles can safely make use of the road network. According to best practice countries need to set safety standards and rules and control these to ensure that vehicles on its roads continually meet these safety standards.

Making certain safety features compulsory to vehicles using the road network, lobbying manufacturers to provide standard safety features, prohibiting certain vehicles, campaigning among potential buyers to buy vehicles with higher safety ratings etc. are all actions that are supportive of the concept of safer vehicles.

In 2013 Morocco had a vehicle population of 3,286,421 registered vehicles of which 2,314,826 passenger cars and other 4-wheeled light vehicles (World Health Organisation, 2015). According to this source, there are no national vehicle standards applicable to frontal impacts, pedestrian protection and electronic stability control.

Tasks in the vehicle chain

The governmental body that is assigned to licensing vehicles in Morocco is DTRSR who covers most tasks in the licensing process. DTRSR are also responsible for the administrative

admission, transfer of ownership and suspensions of vehicles. CNEH is responsible for conducting periodic technical inspections (PTI) and vehicle approval to the public road.
Both organisations fall under the responsibility METL. METL is, amongst others, responsible for policy, supervision, legislation and regulation concerning road transport and road safety.

Morocco has a central motor vehicle register, called *le* Fichier National d'Immatriculation *(FNI)* that is maintained by DTRSR. The personal data of owner(s) and/or holder(s) are taken from the Carte Nationale d'Identité Electronique (CNIE) that is handed over in case of (re)registration. The data in the FNI are not updated by the personal register in the Ministry of Internal Affairs (Ministère de l'intérieur). The registered owner/holder(s) of the vehicle are responsible themselves to inform the FNI about any changes in their (personal) data at the centres immatriculateurs.

Besides the technical information the registers contains information about penalty points, open fines and the PTI status.

The regional departments, de Direction Général de la Sureté National and the Gendarmerie Royale, have no online access to this register. They work with a copy and in case of doubt, or need for actuality central points within the organisations, can have online contact. Information about insurance and tax are not part of the FNI. The responsible ministries keep their own administrations.

Based on the "code de la route", the registered owner and/or hirer/user is responsible for traffic offences, paying taxes, paying fines, applying penalty points and for being insured. In case of a road side inspections the driver will be held responsible for a possible traffic offence. The driver will have to pay and will incur penalty points if at fault. If the vehicle is caught on radar, the owner will have to pay the fine. If not the driver, the owner has the possibility to forward the fine and the penalty points to the driver. The adjudication of fines is not well documented and it is not certain which proportion of issued fines are actually paid, dealt with in court or otherwise.

If the person in question denies having driven the vehicle the registered owner/holder has to pay the fine(s). However, the penalty points cannot be taken from any drivers' licence. When the offence registered by radar is committed with a truck, the registered owner/holder can give the names of the driver, the dispatcher and the receiver of the goods. All of these (legal) persons have a shared responsibility.

The Minister of Interior maintains a separate register of stolen vehicles.

Organisation of IT

The DSI (Direction de Système d'Ínformation) maintains the central motor and driving licence register technically for DTRSR.

Within METL, DSI is responsible for most of its hardware and software. DSI also maintains the ICT for both the vehicle and driving licence registers. DSI works in 80% of the cases for DTRSR.

Projects are contracted and sometimes experts are hired in. All regional offices of the DTRSR are connected to the central database. Modifications carried out by the regional offices are processed real time and on-line. How the registration system is organized (in one centre, which also supports the applications at the prefectures) was not investigated.

Organisation of International activities

In addition to what is mentioned earlier, METL is responsible for all international aspects related to vehicles and driving licences. The Ministry consults other ministries, especially the Ministry of Internal Affairs, with regard to issues relating to vehicle registration and driving licences crime. Morocco is not a contacting partner of WP29 (Harmonization of Vehicle Regulations) of the ECE. Morocco is considering participation because its legislation is to a large extent based on WP29 of the ECE.

Vehicle approval

Policy, supervision and legislation concerning both type approvals and other technical inspections of vehicles are the responsibility of the METL (DTRSR) and is delegated to Centres Immatriculateurs and CNEH.

Vehicle approvals are conducted by the CNEH. The legal basis is the code de la route 52-05. The vehicle regulations are based on ECE regulation from WP29. Also standards like the American Federal Motor Vehicle Safety Standards (FMVSS) and the Canada Motor Vehicle Safety Standards (CMVSS) are accepted. New vehicles with a European Type Approval are admitted in Morocco without further testing. Individual vehicles undergo an administrative test (Certificate of Conformity) and masses and dimensions are checked. Imported vehicles may not be older than five years (date of first registration) with one exception per lifetime. That is when a Moroccan citizen older than 60 years resettles in Morocco in which case they may, for that one instance, import a vehicle between 5 and 10 years old. Morocco does not have a facility for crash testing and issuing type approvals of new vehicles.

Licensing

The administrative activities for licensing vehicles are the responsibility of DTRSR and the centres immatriculateurs. Each centre immatriculateur has a direct online connection to the central vehicle registration, which is held by the DTRSR.

The licensing system is vehicle and department based. Change of vehicle ownership cannot be registered unless there is a valid PTI and outstanding fines on the vehicle are paid. DTRSR keeps up the administration of these fines (Bureaux de Opposition). When a vehicle owner moves from one region to another, the vehicle is relocated to another region, but retains the same license number and number plates. The owner must register the vehicle at the DTRSR in the new region.

Vehicle owners are required to report their personal details (name and address) and any changes to the *centre d'immatriculation*. Omissions and abuses are subject to strict sanctions, such as high fines and imprisonment.

Registration

The departments register all motor vehicles, such as passenger vehicles, commercial vehicles and lorries, motor cycles, agricultural tractors and trailers above 750 kg. New motorcycles of more than 50 cc are currently being registered although regulation is being developed for the registration of new mopeds below 50 cc.

Since some years Morocco uses credit card type registration and licencing documents. The documents have a chip on the cards containing technical vehicle information and information on the vehicle and the owner like penalty points. Drivers must have this document on them when driving the vehicle. The police forces can access the information on the chip by using a special reader.

First registration

Around 163,185 new vehicles and 424,145 imported (second hand) vehicles were registered[12] in 2013. The license plate stays on the vehicle during the entire life of the vehicle. The vehicle is registered on the name of the owner or the holder of the vehicle. In the case of long-term hire or leasing (i.e. longer than two years), the vehicle is registered in the name of the hirer or user. The *carte grise* will then include both the name of the owner (the rental or leasing company) and the hirer or user. A *carte grise* may list several names. First vehicle registrations and transfers of ownerships are carried out by the DTRSR. To obtain a *carte grise*, owners or holders have to provide details related to a buying contact, insurance and tax declaration. They also have to pay for the document. However, unpaid fines may lead to a situation where vehicles cannot be transferred, so that the *centre d'immatriculation* will not issue a new *carte grise*.

Amendments and changes

Around 379,000 changes are entered into the vehicle register every year.

Suspension

There is no formal temporary suspension procedure. Owners who wish to take their vehicles off the road can request a cancellation of the *carte grise*. In such cases the vehicle will not be registered as demolished.

Deregistration

Every year around 1,120 vehicles are deregistered, Deregistration means that the status of a vehicle in the vehicle registration database is changed, i.e. from active into scrapped or exported.

There is a statutory obligation to deregister demolished vehicles, but in practice this rule is rarely applied. When a certified expert declares that a vehicle is seriously damaged in an accident it can be deregistered. Comparison between the annual numbers of registered (almost 600,000) and deregistered (just more than 1,000) shows that, unless vehicles last for more than

[12] Source DTRSR 2014.

500 years, a very large proportion of vehicles is not deregistered.

There is currently no procedure in place to change the status of a vehicle in the vehicle database when a vehicle is exported.

Registration number and number plates

The alphanumeric characters on the number plate consist of three elements. A group of one to five digits, followed by one or two Arabic letter(s) followed by one to or two numbers. The letter corresponds with the city were the vehicle was registered.

Currently DTRSR only sets the standards for the dimensions and size of the number plates. Local entrepreneurs produce the license plates. In practice the quality (and the reliability) of the licence plate is not sufficient. This leads to difficulties with for instance the ANPR. The use of false number plates is a serious offence in Morocco, punishable by up to three months' imprisonment.

Vehicle taxes and fees

Periodical tax

A differentiated tax (also called the 'vignette') is obligatory for all motor vehicles. The tax charge depends on the capacity (in horsepower) of the vehicle. The charges are set by the Ministry of Finance. The average tax charge for an average passenger vehicle was 750 Dirham. Vehicle owners can stop paying tax once a motor vehicle is not used on public roads. However, should the owner wish to drive the vehicle on public roads again, then they must pay all the tax for the period the vehicle was not used on public roads plus a fine.

Registration fee

A registration fee is charged on the issue of the *carte grise* (both for the initial *carte grise* and for any amendments). This fee depends on the vehicle's output (in horsepower) and engine type (diesel, petrol etc.). The fees are set by the region, and the earnings go to the regions. The registration free applies to all vehicles, with the exception of those belonging to the Corps Diplomatique.

A supplementary fee, called the 'taxe parafiscale', is charged on the issue of a *carte grise* for a commercial vehicle or lorry. This fee depends on the vehicle's weight, and ranges from 270 Dirham for vehicles weighing up to 3,500 kg to 2,550 Dirham for those weighing more than 11,000 kg.

Insurance

A sticker on the front window indicates that the vehicle is insured. Drivers must have the insurance document with them when driving the vehicle, so that they can present it to the authorities on request. When applying for a *carte grise,* owners or holders do not have to provide proof of insurance. The central motor vehicle register does not record insurance details.

Tracing and enforcement

Tracing and enforcement are the responsibility of different police forces. The gendarmerie (outside the built up area) and the police (inside the built up area) carry out regular road side inspections. Both technical and driving proficiencies are checked. The police has no on line access to the databases of the DTRSR. The police and gendarmerie have a copy of the vehicle database and they can contact DTRSR among other things about updates, PTI, Motor vehicles tax and insurance issues. Plans are being elaborated to establish an online connection. There is a separate DTRSR inspectorate conducting road side inspection on driving and resting times (tachograph) and the speed limiter.

According to 2008-2010 figures published by the Comité Permanent de la Securité Routière (2011), there were about 4,000 monthly radar checks on speeding resulting in about 140,000 detected speed violations annually. On average a further 400,000 other traffic violations were enforced and fines issued in 2008-2010 (Comité Permanent de la Securité Routière, 2011). Table 26 presents information on enforcement outcomes in period 2013-2016.

Table 26: Development of serious injury crashes

	2013	2014	2015	2016 (*)
Direction Générale de la Sûreté Nationale: traffic enforcement inside urban areas	505,718	643,053	663,165	503,739
Gendarmerie Royale: traffic enforcement outside urban areas	527,153	670,084	749,661	554,631
Ministère de l'Equipement, du Transport et de la Logistique: speed camera enforcement	202,450	465,757	401,046	1,010,930

Source: Official Road Safety Statistics Morocco (Ministre de l'Equipement et des Transports)
(*) from 01/2016 to 30/09/2016

Periodic technical Inspections

Annual Periodic Technical Inspections (PTI) for passenger cars is compulsory after five years. For commercial vehicles and taxis the inspection is yearly. For buses the inspection is every six months. The PTI is divided among five commercial organisations including DEKRA and SGS. The inspections are conducted in PTI stations that only carry out the PTI. Maintenance and repair are carried out by private workshops. The number of PTI inspection centres is about 250. 2,081 million vehicles have to be inspected because they're older than 5 years or due to change of ownership. Every station works with one or more "lines". Pro line one can do pro day no more than 20 inspections on light vehicles or 13 on heavy vehicles. If the vehicle passes the inspection, a sticker is positioned on the inside of the front window. The information includes the next inspection date.

The CNEH supervises the PTI stations in four different ways:

- Random audits on the equipment, building, staff and vehicles that were checked;
- Annual audits;
- Statistical checks on the numbers of vehicles processed;
- Independent audits by Veritas.

To become a PTI inspector one needs a middle level technical education plus a special PTI training. Every year the inspector needs to pass a proficiency training.

The percentage of vehicles that are not compliant (rejected after the first inspection) is 2.7%. The amount of vehicles that are not compliant after repair is not known. Driving without a PTI on public road is an offence and can lead to high fines and scrapping of the car.

The percentage of accidents caused by a mechanical failure is not known. According to rough - estimates expressed during project meetings in Rabat approximately 10% of crashes are the result of vehicle defects. Especially older cars (more than 12 years) are involved in accidents (Ministere de L'Equipement et du Transport, 2012). In different European studies the average contribution of vehicle defects to the cause of crashes is considered to be approximately 6% (SWOV, 2012).

11.6 Road Users

Driving licences

The main partners in the execution of tasks in the driving licence chain are the centres immatriculateurs (regional licensing authorities of which there are 63 where driving licences are issued. They fall under the supervision of the DTRSR.

Training and examination

Any Moroccan or foreign nationals legally residing in Morocco can take the examination for category B. The applicant must justify his physical and mental abilities by a medical certificate and have a minimum age of 18 years. The candidate must submit an application before undergoing training with a school certified by the METL. METL has a right to control the functioning school. The review is supported by officials under the TEM.

The license is valid for 10 years and renewal is subject to a medical examination. Foreign licenses are exchangeable subject to the existence of a recognition agreement between Morocco and the issuing country.

There is system of 'supervised driving' (as known in Europe) in Morocco. After passing the theoretical test, learners must have at least 3,000 kilometres' driving experience and complete at least 20 hours' driving lessons at an accredited driving school, as well as take part in educational meetings which must also be attended by the supervisor and official driving instructor. When these conditions are met, the learner may apply for a practical examination. The practical examination is carried out on a circuit (to test parking skills) and on a fixed part on public roads (to test vehicle control, driver skills and rules of the road). There are plans to carry out the test on public roads only.

If the learner passes, he or she is issued with a temporary driving licence which contains 24 penalty points. After two years the licence can be exchanged for a permanent licence at the prefecture.

Driving tests are administered by civil servants from the DTRSR. Driving schools are accredited by the prefect. Their operations and the quality of training are supervised by the METL.

Driving licence documents

Driving licences are issued on a plastic card with a chip and a security system. The chip contains dynamic information like the points of the driving licence. The driving licence is not an official identification document. In 2013 306,692 new driving licences were issued.

Driving licences are valid for ten years. For renewal one must undergo a medical approval. The conversion of foreign driving licences takes place at the prefectures at the departments, when there is juridical bases in a treaty with the nation of origin.

Registration of driving licences

The central driving licence register, called Le Ficher National de Permis de Conduire, is also maintained by the DTRSR. The information in the register covers the various driving licence categories, the loss of driving licence points, and the reasons for suspension. A photograph is part of the registration. The right of inspection is free of charge.

Registration of offences

A driving licence point system is being operated. Every experienced driving licence holder starts with 30 points whereas inexperienced (new) drivers start with 20 points. Points are deducted when offences are committed. The number of deductions every year is not known. The point totals are recorded in the central database and on the driving license. The holder is informed of a deduction in writing. If the holder commits no offences over a three -year period, any deducted points are restored. To have points restored before that time, a driving licence holder can take a driver education course for three days, at a cost of 700 Dirham. This option can be taken up once every two years.

Driving licence holders can lose their licences in two ways, either by legal judgement or by deduction of points. It is not known how many drivers lose their driving licence each year as a result of suspensions or due to point deductions.

11.7 Post-crash Response

The country has relatively limited resources to deal with road crash victims. There are no dedicated trauma teams for road crashes and these are dealt with as any other trauma patients in hospitals which are equipped with special trauma units. Not all hospitals have these facilities nor do all ambulance services have specialised and trained trauma team personnel.

In 2012, there were more than 2,100 ambulances operational in Morocco of which 40% belonged to the Ministry of Health. In 2012, the Ministry of Health published a plan for improving post-crash care (Ministère de la Santé, 2012). Under the responsibility of the Ministry of Health several improvements have and will be implemented for emergency medical care including the care of traffic victims. These include:

- Construction of Trauma Centres are planned in the coming years dedicated to trauma with specialised and trained trauma team personnel (the first construction is on-going in Casablanca);
- In recent years, the ambulance fleet has been reinforced with new ambulances provided with emergency and reanimation equipment;
- Emergency and Intensive Care Transportation land and air Services have been established;
- Emergency Care Training Centres have been established responsible for training in emergency care gestures for all Emergency staff;
- New field of specialised nurses in emergency and intensive care have been established the laureates of which are dedicated for emergency services including medical transportation;
- Institutes of ambulance technicians have been established delivering training of ambulance technicians who, in addition to driving, deliver basic emergency care;
- Medical doctors specialised in trauma have been dispatched over the country in provincial, regional and University hospitals,

The subject of medical service to traffic victims has also received considerable research interest in Morocco. Several scientific regional studies of factors that influence the process and medical outcomes of post-crash response have been performed (Mohammedia, 2010; Messnan, 2014; Mohammed, 2013; Rhidifa, 2013; Kandri Rody, 2015).

11.8 Data Collection and Crash Reporting

Road crashes in Morocco are registered by the police and the Gendarme. According to officials at the Roads and Road Traffic Department, the registration rate of crashes is high with almost all crashes being recorded in the system. However, the exact rate is not known from the literature nor from discussions. It is a well-known and well reported fact (Amoros, Martin & Laumon, 2006; Elvik & Mysen, 1999; James, 1991) that road crashes are generally underreported. Furthermore, there is a strong statistical relationship between the registration rate and the degree of injury (the more serious the more likely it is registered). However, certain categories of crashes are more affected than others (for instance a crash between two cyclists is less likely to be registered than a crash between two vehicles). Also the location of crashes has an influence, crashes occurring in remotely accessible areas are likely not to be registered by the police and therefore making use of hospital records to derive more accurate estimates of actual injury crashes is strongly recommended (Amoros, Martin & Laumon, 2006; James, 1991; Vis et al., 2011). The practice of corroborating the police registered crashes with hospital registrations is currently not carried out in Morocco.

11.9 Conclusions and Recommendations

Road safety research and development

Overall, research, development and knowledge transfer on road safety matters take place on an ad-hoc basis in Morocco. A dedicated road safety research programme, backed by sustainable funding sources and carried out by dedicated research staff is currently not apparent. The feasibility of establishing a dedicated road safety research institute as an independent entity or as part of a future road safety agency needs to be further explored.

Road safety management

It is recommended to improve the data exchange cooperation between the different stakeholders (like DTRSR, CNEH, CNPAC, CNER, Police and Gendarme) to increase road safety. In various processes it was observed that the flow of information between the different institutions was complex or non-existent.

Road safety inspections or systematic assessments from a road safety engineering perspective are not routine. Inspections are generally carried out as part of pavement management and maintenance programs but do not include specific road safety elements. Target setting based on (safety performance) indicators is not included as part of the overall road safety improvement plan nor are these monitored.

In addition to these more general points following list of activities (not exhaustive) is recommended:

- Develop a comprehensive strategy based on harder targets, both in terms of crashes and intermediate outcomes.
- Develop a critical offences monitoring strategy and program.
- Initiate studies for checking the crash registration rates.
- Develop systems to link hospital data with crash data to control for under-registration and validate severity.
- Set targets and programmes for addressing high risk locations.
- Identify and secure funds to address high risk locations.
- Develop an integrated quality control system for road design (audit guidelines; courses etc.).
- Practical driving examination can be improved by testing drivers on a random route containing normal traffic conditions instead of on a fixed route.

Enforcement

Certain critical offences in Morocco are monitored although these do not appear to be systematically reported. The following offences are monitored based at locations identified from crash data to be high risk locations:

- Speeding
- Seat belt wearing
- Helmet wearing (motorcycles)
- Red light violations, and
- Stop and yield sign violations.

It is recommended that the current critical offences monitoring strategy and programme is further developed and more systematically related to the enforcement methods and levels.

With regard to vehicle registration and enforcement it was observed that vehicle owners and drivers seem to be able to find opportunities to escape their obligations like paying fines. As a consequence enforcement measures are less efficient. The legal basis for improvement of the cooperation between the various parties involved in the vehicle chain should be explored and enforcement bodies should have online access to all relevant data, 24/7. It is recommended to: investigate to what extent drivers and vehicle owners can avoid fines and other enforcing measures; investigate to what extent this hinders enforcement; investigate possible improvements such as tightening the legal basis for enforcement, improved data- exchange and access to data for all authorities involved and/or improvement of the relevant registrations such as connecting the registration of vehicle holders/owners and the central population register.

Technical vehicle details are difficult to verify without reliable sources such as for instance in the Netherlands the RDW's type approval database. Despite a legal base for PTI, many vehicles do not seem to comply with the PTI requirements. It is recommended to benefit from the international network to enhance the reliability of the technical and owner information of vehicles that are offered for registration in Morocco.

Access to EUCARIS is recommended to explore, not only regarding road safety but also vehicle crime EUCARIS is a network of vehicle registration authorities to exchange vehicle related data. For instance when a vehicle is stolen or scrapped. Access for Morocco can help both Europe and Morocco to fight vehicle and driver license crime. The conditions for Morocco are investigated. Morocco must comply for instance with the European directives for privacy and data security.

Another recommendation is to improve the effectiveness of PTI. Currently, a high percentage of non-compliant vehicles appear to be present. Even taxis that are under a strict regime often appear to have malfunctioning head and taillights, worn tires, poorly aligned wheels and not functioning seatbelts. Given the high number of older vehicles that are involved in accidents, it is recommended intensifying the knowledge exchange between RDW and CNEH.

Heavily damaged vehicles that are repaired need special attention. The automated control of damaged vehicles ensures that deformations of the vehicle were repaired according to the rules of the art and are within the limits accepted by the manufacturer. Given the average vehicle age and the quality level of repair, it can be investigated if such a control can at this stage, contribute to road safety.

It is furthermore recommended to use clear national criteria for placing speed cameras and red light cameras based on the number of accidents, fatalities and injuries. Before investing in automated systems supporting legislation must be in place. Without proper legislation the enforcement system will be challenged by appeals and lead to processing delays. In addition, when using such equipment it is strongly recommended to use properly calibrated systems. Otherwise the legal systems will be overloaded with appeals.

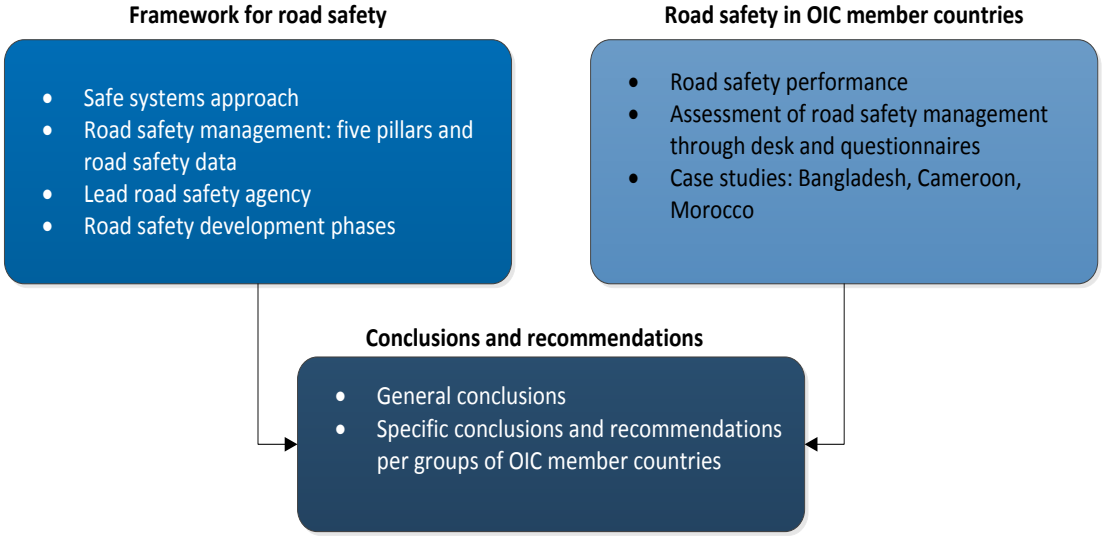
Section 4: CONCLUSIONS AND RECOMMENDATIONS

12 Conclusions and Recommendations

12.1 Introduction

This section presents conclusions from the previous sections, notably from the framework for road safety (Section 1) on the one hand and the review of road safety in OIC member countries (Section 2) and the three case studies (Section 3) on the other hand. These elements together provide the basis for formulating recommendations, as illustrated in Figure 19.

Figure 19: Conclusions and recommendations



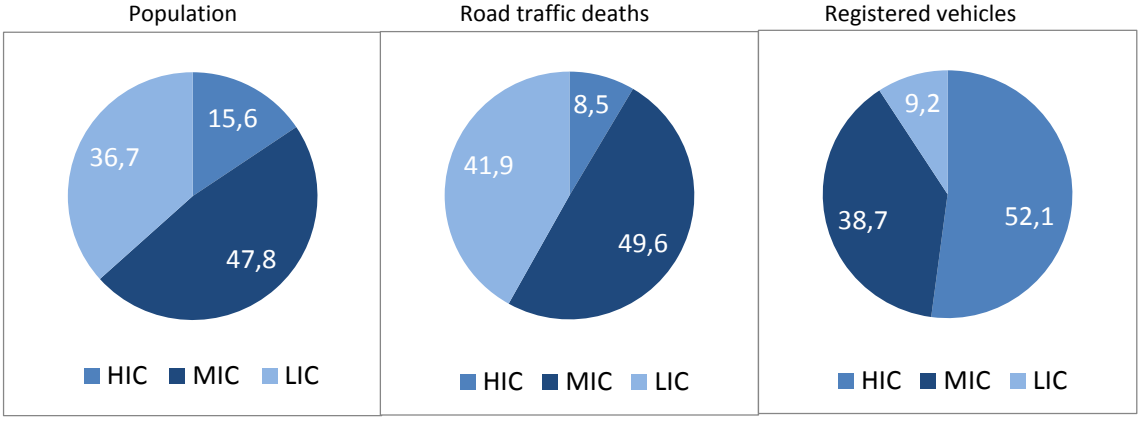
12.2 A framework for Road Safety Improvement

The WHO estimates that more than 1.2 million people die on the world's roads annually. The majority of these deaths occur on the roads of middle and low income countries and cost these countries approximately 3% of GDP annually. Traffic crashes are preventable, yet they are still one of leading causes of mortality in todays' society.

The WHO (WHO, 2009) reveals that the annual number of fatalities worldwide seems to have stabilised. However, this is primarily attributable to significant improvements in road safety management in high income countries. Trends in middle and low income countries show a different picture in which traffic mortality rates are disproportionately high and the number of road traffic deaths are increasing. Low income countries have the highest traffic mortality rate (24.1 deaths/100,000 inhabitants); almost three times that of high income countries (9.2 deaths/100,000 inhabitants).

This is reflected in Figure 20 which indicates that over 90% of the road traffic deaths occurs in low and middle income countries, which have only 48% of the world's registered vehicles. Expected growth in car ownership and motorisation in low and middle income countries in the coming decades will continue to put pressure on road safety in the low and middle income countries. Hence the need for action, as illustrated below.

Figure 20: Population, road traffic deaths, and registered motorized vehicles



Source: WHO, DoA for road safety, 2011-2020

Decade of Action

The UN launched its Decade of Action for Road Safety in over 100 countries in 2011. The ultimate aim of the programme was to prevent five million road traffic deaths by 2020. The activities in the Decade of Action are built on five road safety pillars:

1. Road Safety Management;
2. Safer Roads and Mobility;
3. Safer Vehicles;
4. Safer Road Users;
5. Post-crash Response.

Three of these pillars are traditional elements of the road traffic system (roads, vehicles, users) and are usually treated separately, often applying the 3 E's: education, enforcement and engineering. The UN resolution encourages countries to implement integrated road safety strategies targeting all five the pillars. These strategies should be developed taking into account country specific requirements, resources and capabilities.

Safe Systems Approach

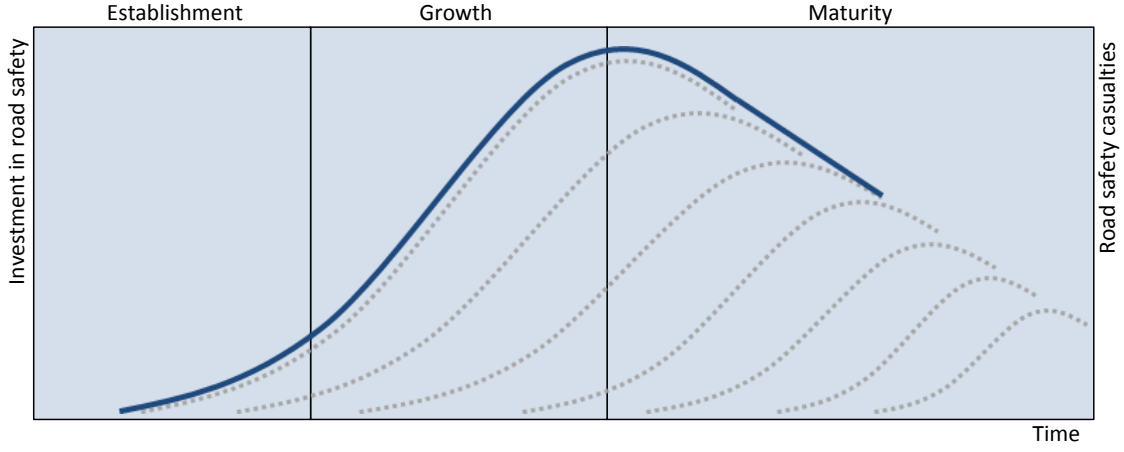
In two of the safest countries in the world, Sweden and the Netherlands, it was realized that all of the elements, as included in the five pillars, have to work together as a system. The Swedish Vision Zero and Dutch Sustainable Safety were the inspiration for the internationally accepted Safe Systems Approach. There is no Safe Systems blueprint; hence it is called the Safe Systems Approach. The approach is universally applicable, but putting Safe Systems thinking into practice requires local knowledge and consideration.

A framework for road safety is used in this project, based on the Safe Systems Approach and the five defined road safety pillars. This framework is used for benchmarking road safety management in the OIC member countries is conducted as a basis for developing strategic directions and providing policy recommendations.

Road safety development phases

A clear relationship can be established between road safety initiatives and policies and the longer term effects on road safety, as described in Chapter 5. This pattern shows a number of road safety development phases, i.e. establishment, growth and maturity, as indicated in Figure 21. The curve indicates an increasing road safety problem, with growing number of road safety casualties, due to rapid motorisation and an eventual reverse of the curve as a result of road safety policy and measures. Almost all countries go through a similar phased road safety development. As such, countries can learn from other countries that are in a similar development phase or have proceeded to a next development phase. A country can focus on how to best deal with the current situation, based on its current development phase, but also anticipate on challenges ahead, linked to a next development phase.

Figure 21: Road safety development phases



Typical road safety management characteristics have been developed per road safety development phase for the five road safety pillars, as well as road safety data. These characteristics are summarised in Table 277. These characteristics, as part of the framework for road safety, are applied to the OIC member countries, as indicated below.

Table 27: Road safety development phases and typical characteristics

Development Phases	Establishment	Growth	Consolidation
Road safety management	• No/limited political will • Limited interaction between stakeholders • Lack of coordination, no integrated approach • Limited funding • Weak legal framework • Limited supporting research • No local research	• Road safety growing concern with political support. • Limited funding • Treatment segregated • Limited coordination • Limited local research • Limited monitoring evaluation • Fair legislative framework	• Well-developed political support • Fair to high degree of integrated coordination • Fair to adequate funding • Supporting legislative regulatory framework • Intergraded action programme • Targeted research
Safer roads and mobility	• Underdeveloped road network • Limited sized network • Poor road conditions • Lack of road standards • Limited capacity in road management • Limited attention for vulnerable road users	• Developing road network • Varying design standards • Fair road maintenance • Limited attention for vulnerable road users • Developing public transportation facilities	• Developed road network • Good public transport facilities • Integrated planning and development • Multimodal systems • Good quality facilities
Safer vehicles	• Low car ownership and low vehicle mileage • Limited vehicle standards • High age of vehicles • Limited roadworthy tests • Weak public transportation	• Growing car ownership • High age of vehicles • Developing public transportation	• Stabilised car ownership • Low age of vehicles • International vehicle standards applied • Standard requirements for new and existing vehicles • Good public transportation

Development Phases	Establishment	Growth	Consolidation
Safer road users	• Low quality drivers • Limited road safety awareness (speeding, helmets, alcohol, seat belts, child restraints) • Limited effective road safety education • Ad hoc enforcement aimed at income generation vs safety	• Growing number of drivers • Low seatbelt rate • Low adherence of traffic laws • Improving critical offence rates • Increased enforcement • Ad hoc education and promotional campaigns	• Good quality drivers • Low infringement rate • Penalty point driver licensing • High and visible enforcement • High compliance rates to critical offences • High awareness of road safety • Well established training and educational programs • Strict control for licensing
Post-crash response	• Limited number of ambulances • Limited trauma centres • No protocols on road crashes	• Ambulances and trauma centres in major urban areas • Reasonable levels of training • Protocols available	• Adequate number of trauma centres and personnel • High quality protocols • Performance monitoring and evaluation of targets
Road safety data	• Low quality crash data • No crash management system • Poor registration and reporting • Inadequate system protocols • Poor control checks and balances • Limited exposure data • Poor location data	• Poor to reasonable quality crash data • Limited controls and verification • Locations generally known • Limited critical offence and enforcement data	• Moderate to high quality crash data • Exposure data widely available • Location specific • Enforcement data available • Critical offences data available

Source: Ecorys and SWOV

12.3 Road Safety in OIC Member Countries

Road safety performance

A comparison has been made of road safety performance, measured in mortality rate (number of road traffic deaths per population size), in OIC member countries and non-OIC member countries. Mortality rates are then linked to economic development of the OIC member countries, measured in income per capita, resulting in the classification of high income country (HIC), middle income country (MIC) and low income country (LIC).

The OIC member countries show diversity in road safety performance, with mortality rates ranging from 8.3 (Bahrein) to 32.1 (Iran). Regional differences exist, with mortality rate averages of the OIC member countries in the African group of 24.5; the Arab group of 21.2 and the Asian group of 16.1 Mortality rates in the OIC member countries are in general higher than expected, based on comparison with other countries of similar income levels). As an indication, the world average mortality rate 18.8 and the global average for MICs and LICS is 19.5 and 21.5 respectively.

As for road safety performance, the OIC member countries can be stratified into four groups:

1. HICs with much higher road mortality than average for HICs in general.
2. MICs with higher than average road mortality.
3. MICs with lower than average road mortality.
4. LICs with mortality that is high in an absolute sense.

Road safety management

This literature review revealed that member countries of the OIC generally are in the early development stages of the Safe Systems Approach, as advocated by the Global Plan for the Decade of Action. A number of countries in the Arab and Asian region have taken steps to improve road safety management to the extent that they are now comparable to many other international countries, which have adopted and practiced the Safe Systems Approach. However, these countries have not as yet developed an integrated approach across all pillars (including roads and mobility; vehicles; road users and post-crash care) sufficiently to be considered as practising the fundamentals of a Safe Systems Approach.

Countries worth mentioning as seemingly to have advanced most in the direction of a Safe Systems Approach are the United Arab Emirates and Kazakhstan and to a lesser extent Oman, Turkey and Malaysia.

12.4 Road Safety Development Phases in OIC Member Countries

There is a general relationship between road safety performance and economic development, as indicated in Chapter 6. Table 288 presents the economic development levels for the OIC member countries. As can be seen, the majority of OIC member countries is in the category MIC, followed by the category LIC. It should be noted that regional differences exist, i.e. the majority of the OIC member countries in the African region are LIC, whereas the Arab region has a relatively high number of HICs.

Table 28: OIC member countries and economic development

Low Income Countries	Medium Income Countries	High Income countries
Afghanistan	Albania	Bahrain
Bangladesh	Algeria	Kuwait
Benin	Azerbaijan	Oman
Burkina Faso	Cameroon	Qatar
Chad	Côte d' Ivoire	Saudi Arabia
Gambia	Djibouti	United Arab Emirates
Guinea	Egypt	
Guinea-Bissau	Gabon	
Mali	Guyana	
Mozambique	Indonesia	
Niger	Iran Iraq	
Sierra Leone	Jordan	
Somalia	Kazakhstan	
Tajikistan	Kyrgyz Republic	
Togo	Lebanon	
Uganda	Libya	
	Malaysia	
	Maldives	
	Mauritania	
	Morocco	
	Nigeria	
	Pakistan	
	Senegal	
	Sudan	
	Suriname	
	Tunisia	
	Turkey	
	Turkmenistan	
	Uzbekistan	
	Yemen	

Source: Ecorys and SWOV

All of the OIC member countries are in the establishment or growth phase, based on both the relationship between road safety performance and economic development and the road safety characteristics per road safety development phase, as established in Table 277[13]. Some OIC member countries, notably the LICs and the countries that score low on the Safe Systems Approach, as established in Chapter 7, are in the establishment phase. For example, Gambia and Togo have high mortality rates and score relatively low on the five road safety pillars and development and use of road safety data[14].

[13] As argues above, some OIC member countries have advanced well towards a Safe Systems Approach, but given the fact that these countries have not yet developed an integrated approach across all pillars sufficiently, the countries are not yet in the maturity phase.

[14] The five road safety pillars are rated in Chapter 7, mainly based on information provided in the annual WHO global status of road safety reports.

A considerable number of OIC member countries, notably the middle and high income countries, have developed towards the growth phase. This typically comes with a growing awareness for road safety as a problem for society and emerging political support. A supporting legislative framework is developing. However, funding is still sub-standard and coordination is limited. The road network is developing, yet the quality of the road network is far from optimal, especially on local and regional roads, also due to poor road maintenance. Car ownership is growing, and so is the number of drivers, but the quality of the vehicles is relatively poor, also as a result of the relatively high average age of the vehicles. Although enforcement is increasing, the adherence of traffic laws is (still) low. Post-crash response is developing, with ambulances and trauma centres becoming available in larger urban areas. Accident data is still underdeveloped but improving in quality.

12.5 Recommendations towards Improving Road Safety

Starting point: know where you stand

This report concludes that a country faces specific challenges that are linked to road safety development phases. Furthermore, typical policy measures are proposed that are effective in the defined road safety development phases. At the same time it is acknowledged that no blue print is available to solve road safety problems in a country and measures need to be tailored to the needs and characteristics of a country. Therefore, it is important to know where a country stands in terms of its road safety development phase, taking into account the country specifics, to determine appropriate action.

Specific tools have been designed to assist countries in conducting road safety capacity reviews and prepare follow-up road safety projects. For example, the World Bank has developed the Road Safety Management Capacity Reviews and Safe System Projects Guidelines (Bliss & Green, 2009). The guidelines, which include checklists to conduct the road safety capacity review, will provide useful guidance, including[15]:

- Specify a management and investment framework to overcome institutional capacity barriers and support the successful implementation of road safety interventions;
- Provide practical procedures designed for application at a country level to accelerate knowledge transfer and sustainably scale up investment to improve road safety results;
- Ensure that institutional strengthening initiatives are properly sequenced and adjusted to the absorptive and learning capacity of the country concerned.

It is highly recommended to invest in a road safety capacity review, either using the above-mentioned guidelines or other approaches. Although the procedures are extensive and generally time consuming, thus costly, this should not be seen as a barrier to implementing a comprehensive review, as the benefits can be substantial. The more specific the assessment is made, the better actions towards improving road safety can be tailored.

[15] According to the World Bank: http://www.worldbank.org/en/topic/transport/publication/road-safety-management-capacity-review-guidelines.

General recommendations: no regret actions

Most OIC member countries are in the establishment and growth phase. The current investment into road safety is considered low by most standards and decision makers and politicians must realise that *substantial investment* will be required in future if the country wants to reduce the current economic burden of road crashes on the economy.

For all OIC member countries general road safety improvement measures can be found in the following directions.

- Applying a *Safe Systems Approach* by developing a road transport system that accounts for human error and the vulnerability of the human body and considering all the road safety aspects, as reflected in the five road safety pillars, in an integrated way.
- *A cohesive approach with clear tasks and responsibilities*. Knowing the multi-disciplinary character of road safety and the large number of stakeholders involved, it is important to develop a cohesive approach, which can be reinforced by appointing a lead agency.
- *Raising awareness for road safety*. This is relevant throughout society, from politicians, having to place road safety on the political agenda, to children, needed to be educated on road safety.
- *Knowledge transfer and capacity building*, leading to a knowledge base that is shared between the various stakeholders involved in road safety.
- *Sound understanding of road safety* is crucial, which is reflected in research in the following areas:
  - Analysis of crash types and crash factors, as a basis for defining effective measures.
  - Further analysis related to motorisation level and travel behaviour, as a basis for understanding the context of road safety.

Specific groups of OIC member countries may benefit from the following approach.

- HICs, as defined in Table 28, might be able to deal with their problems when supplied with sufficient adequate knowledge, regarding their specific road safety situation and adequate best practices.
- The higher than average MIC group might gain from a specific approach where road and transport infrastructure is improved, focussing on specific safety problems, notably regarding pedestrians.
- Countries that still have to go through a motorisation growth, should focus on a policy regarding vehicles (affordable and not too fast cars rather than powered two wheelers) and to improve infrastructure in time. Paired with that is setting vehicle and driver standards and ensuring that the enforcement and controls of these standards are put in place.
- LICs, as defined in Table 288, could benefit from focus on simple infrastructural measures, e.g. by improving pedestrian safety.

Specific recommendations: linked to road safety development phase

Each OIC member country can position itself in one of the road safety development phases. The economic development of a country, measured in income per capacity, can be used as a starting point for this. The typical road safety characterises, as defined in Table 277 can be used as an additional means for positioning. The identified road safety development phase helps to define relevant policy measures. It should be mentioned that countries can be in different phases per road safety pillar. In this case it is recommended to focus on the policy measures that are linked to the relevant development phase.

Below, policy measures are presented for OIC member countries in the establishment and the growth phase[16]. Table 29 identifies policy measures per road safety pillar (as well as road safety data) for the OIC member countries that are in the *establishment phase*.

Table 29: Policy measures for OIC member countries in the establishment phase

Road Safety Pillar	Measures
Road safety management	• Garner political support for road safety • Improvement of poor to medium quality road safety information systems • Development of co-ordination structures • Assigning lead agency responsible for road safety management • Development of coordination structures • Development of policy review procedures • Setting of short term targets and long term initiatives • Develop and maintain specific delivery partnerships between government, NGO, community and business at the central, regional and local levels
Safer roads and mobility	• Develop road network categorisation plans • Develop appropriate functional and operational characteristics for road types • Setting of appropriate speed limits • Encourages public transportation use • Develops strategies and plans for vulnerable road users • Secures funding for development projects
Safer vehicles	• Establish vehicle registration registers • Develop minimum standards for entry of vehicles on public roads • Develop roadworthiness criteria and monitoring systems • Develop enforcement strategies • Set standards and regulations regarding the use of vehicles

16 No policy measures are included for the growth phase, as it was concluded that no OIC member countries have advanced to the maturity phase. However, in case a country has advanced to the maturity level at a pillar level, or if interested in measures at maturity level, one id kindly referred to Table 11.

Road Safety Pillar	Measures
Safer road users	• Set the safety standards and rules and continuing compliance requirements that will ensure the safety of the individual concerned but also that of fellow road users • Develop standards for driver licensing, testing and appraisal • Driver offences monitoring • Develop and implement educational programmes for school children • Develop strategies to improve safety of vulnerable road users
Post-crash response	• Review the capabilities and capacity of trauma response units • Establish key performance data and set targets • Develop monitoring systems • Implement regional pilot projects • Develop strategies to improve capacity and resource allocation for trauma response and management
Road safety data	• Establish central computerised transport and driver licensing registries to manage data on the number of vehicles and drivers on the road which are easily accessible for enforcement agencies • Establish a reliable crash reporting and recording system • Develop programmes to obtain supplementary data for road safety management (traffic volumes; speeds; etc.)

For the OIC member countries that are in the *growth phase* recommended actions are presented in Table 30.

Table 30: Policy measures for OIC member countries in the growth phase

Road Safety Pillar	Measures
Road safety management	• Foster relationships to maintain political support for road safety • Development of medium to high quality management information system • Coordination central levels • Adopting short to medium term road safety targets • Analysing what can be achieve in the medium term • Develop and maintain specific delivery partnerships between government, NGO, community and business at the central, regional and local levels
Safer roads and mobility	• Implements large scale remedial road improvement projects • Implements strategic road network development plans • Implements large scale improvement projects for vulnerable road users • Adopts an integrated approach to road infrastructure planning and provision • Adopts a Safe Systems Approach to road design

Road Safety Pillar	Measures
Safer vehicles	• Maintain and improve vehicle registration and licensing • Vehicle roadworthiness • Vehicle standards • Traffic offence monitoring of roadworthiness • Public transportation vehicle standards • Commercial vehicle standards
Safer road users	• Review and set the safety standards and rules for continuing road user compliance. • Driver licensing and testing • Offences monitoring • Targeted law enforcement and critical driver offences monitor • Informed educational and publicity campaigns for improved road user behaviours • Securing legislative resources for road safety
Post-crash response	• Emergency response goals and monitoring • Fleet assessment • Quality reviews emergency and trauma care • Protocols and standards • Funding for emergency and trauma care
Road safety data	• Evaluate and improve crash registrations • Develop supportive Safety Performance Indicators (SPIs) • Establish central computerised transport and driver licensing registries to manage data on the number of vehicles and drivers on the road which are easily accessible for enforcement agencies • Establish linkages between national causes of death statistics to assess and validate traffic fatalities; • Establish or adopt tools for local highway and police authorities to undertake data collection, analysis and monitoring techniques and database management. • Report road safety results and progress made and make interactive crash data systems available on the Internet.

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Appendix 2: Checklist: Results Focus at Systems Level

Questions	Yes	Partial	Pending	No
Are estimates of the social costs of crashes available?				
Are data on road deaths and injuries readily available?				
Have the risks faced by road users been identified? • Drivers? • Passengers? • Motor cyclists? • Pedestrians? • Cyclists? • Children? • Others?				
Has a national vision for improved road safety performance in the longer-term been officially set?				
Have national and regional targets been set for improved safety performance? • Social cost targets? • Final outcomes targets? • Intermediate outcomes targets? • Intervention output targets? • At risk group targets? • Industry targets? • Other targets?				
Have all agencies responsible for improved safety performance been identified and are they formally held to account for their performance required to achieve the desired focus on results? • Highways? • Police? • Transport? • Planning? • Justice? • Health? • Education? • Others?				
Have industry, community and business responsibilities for improved roads safety performance been clearly defined to achieve the desired focus on results?				
Are regular performance reviews conducted to assess progress and make improvements to achieve the desired focus on results?				
Has a lead agency been formally established to direct the national road safety effort to achieve the desired focus on results?				
Is the lead agency role defined in legislation and/or policy documents and annual performance agreements to achieve the desired focus on results?				

Source: Bliss, T. & Breen, J. (2009). Implementing the recommendations of the World Report on Road Traffic Injury Prevention Country Guidelines for the conduct of road safety management capacity reviews and the specification of Lead Agency reforms, Investment strategies and safe systems projects. World Bank Global Road Safety Facility, Washington DC

Notes:

It is important to probe the risks faced by different road user groups, assisted by available data from highway agencies, police, hospitals and other sources. It is also important to locate and rank those sections of the road network with the highest concentrations of deaths and injuries, across the hierarchy of urban roads and the hierarchy of inter-urban roads. Where data are deficient or simply unavailable extensive consultations with relevant groups may be required to identify user groups most at risk and to locate hazardous sections of the network. The best starting point for these discussions is within the health sector, particularly with the emergency services staff that attend to crash victims in the pre-hospital phase.

The issue of acceptable and achievable levels of safety and related responsibilities and accountabilities must be addressed at the highest agency and ministerial levels, especially across the transport and health sectors. In this dialogue it is important to identify and discuss the scale of the national health loss incurred by road crashes, compared to other causes of death and injury in the country concerned.

Appendix 3: Weighting Applied to Rate OIC Countries

Pillar/Function	Weighting applied to response category (score per response type)
Safety management (Have a lead agency performing the institutional management functions)	5x No = 1 (5 No answers = 1 point=very poor) 1x Yes = 1 (1 Yes answer=1 point = very poor) 2x Yes = 2 (2 Yes answers=2 points= poor) 3x Yes = 3 (3 Yes answer=3 points=average) 4x Yes = 4 (4 yes answer=4 points=good) Fully funded and 4x Yes= 5 (Excellent)
Roads and mobility (have compliant standards etc.)	5x No = 1 1x Yes = 1 2x Yes = 2 3x Yes = 3 4x Yes = 4 5x Yes = 5 Subnational = yes
Vehicles (have compliant standards and practices)	3x No = 1 1x Yes = 2 2x Yes = 3 3x Yes = 4 More or the same as 50% 2-3wheeled motorized vehicles = -1 Less than 50% 2-3 wheeled motorized vehicles = +1
Road Users (have compliant standards and practices)	< 4 Laws = 1 >,=4, <7 Laws = 2 7 Laws = 3 Apply and limits, < 50% yes = -1 Apply and limits, >,= 50% yes = +1 Mean enforcement < 6 = -1 Mean enforcement >,= 6 = +1
Post-crash care (have compliant systems and standards)	< 1x Yes = 1 1x Yes = 2 2x Yes = 3 3x Yes = 4
Road safety data (have good registration and current and historical and good data)	Trends in road traffic death available = +1 Deaths by road user category available = +1 Reported road traffic fatalities less than 80 % compared to the estimated WHO road traffic fatalities = -1 Reported road traffic fatalities more or the same as 80% compared to the estimated WHO road traffic fatalities = +1 Trends in road traffic death dotted line = -1 Trends in road traffic death solid line = +1

Appendix 4: Desk Research Results on Selected OIC Member Countries

More detailed review of selected OIC member countries

A literature search was carried out for documentation describing road safety studies and evaluations in all of the OIC member countries. The search was limited to documents focussing on road safety studies and related to national road safety developments and trends. The search focussed on primarily English documentation. Given the limited scope of this literature study, this part of the study concentrated on two countries from each OIC region. For each country an overview, based on the five pillars described in the UN's Global Plan, on road safety was prepared on the basis of available literature. The purpose of this was to provide a more detailed benchmark of the state of road safety development in a country and supports the summaries prepared in chapter 6.1. Although these country reports provide significantly more insight into the state of road safety with respect to development in each of the pillars, it must be borne in mind that these are based on a relatively small selection of English reports available on internet. The content of these reports is fairly specific and not necessarily directed at the specific aims and goals of the Pillars as outlined in the Global plan. The relationship between the findings of the reports and the aims of the Global Plan are sometimes inferred and do not necessarily reveal the true extent of development in a particular area of road safety. For this full capacity reviews are necessary.

However, for the purpose of this literature study these country reports provide an example and a basis of how to conduct cross-country benchmarking studies. The country reports should where possible be based on capacity reviews and where this is not possible, relevant documentation must be sourced that provides results and evidence of road safety developments in a specific field (or Pillar). Such evidence must be supportive of actual implementation projects and not be pure theoretical exercises (such as often described in policy and strategies). These country reports can ultimately be used to score and rank the road safety performance of individual countries as illustrated in chapter 6.1.

Arab Region

Road Safety in Morocco

Introduction

Morocco has a population of 33.8 million and a total land area of 710.850 square kilometres. In 2013, 3832 people were reported killed by road traffic accidents (World Health Organisation, 2015). However, this number might be an underestimation since not all fatalities are reported. The WHO estimates 6870 road traffic fatalities for 2013, equivalent to a rate of 20.8 road fatalities per 100.00 people which is slightly higher than the average of 20.1 for middle-income countries (World Health Organisation, 2015b).

The World Health Organisation report of 2015 shows that there are around 3 million registered vehicles in Morocco. Most of these vehicles are cars and other 4-wheeled light vehicles.

Registered motorized 2- and 3-wheelers are very rare and only account for around 1% of the total registered vehicles. On the other hand, registered heavy trucks account for approximately 25% of the total registered vehicles (World Health Organisation, 2015b) .

Road safety data

In case of a road crash, crash data are collected at the scene of the crash by the police. In rural areas the Gendarme collects the data and in urban areas the national police are responsible. The police are expected to attend crashes that involve fatalities or serious injuries. However, data is not always recorded if the accident only results in material damage. In case of a fatal or serious injury crash, information is collected at the scene. This information is filled in on a form similar to that used in France. The information filled in on this form contains the circumstances of the crash, the location, the casualties, etc. (OECD/ITF, 2016).

After the data is collected, it is then entered into a database. The police can stay in contact with the hospitals to complete or adjust the reports of the accident. However, this is not systematic and occurs incidentally (Schermers et al., 2015).

Road Crashes

Fatal road accidents occur more in rural areas than in urban areas according to the data of the OECD and ITF. About two-third of the road traffic fatalities occur on rural roads. Speeding is a common problem in rural areas, resulting in more fatal road accidents. While there are a lot of speed limit signs at roads, not every road user feels responsible for maintaining this speed.

Occupants of cars and light vehicles account for 37%, the largest proportion, of crash fatalities. Pedestrians account for 27% and riders of powered 2- and 3-wheeled vehicles for 20% (Schermers et al., 2015). The situation for all road users has worsened between 1990 and 2013. Especially the situation for motorcyclist has deteriorated, with a fatality rating that doubled. The increase in the fatality rating of motorcyclist is probably caused by the sharp increase in the motorcycle fleet in Morocco (OECD/ITF, 2016).

Road crashes cost Morocco an estimated 2.0% of its GDP. Trends in reported road traffic deaths show that road traffic deaths stay about even through the years. Underreporting should be taken into account when using data of reported trends (World Health Organisation, 2015b).

Pillar 1: Road safety management

In Morocco, the Ministry of Equipment and Transport and Logistics (METL) has the overall responsibility for road transport. This includes the administration and regulation of road transport. There are departments and agencies in Morocco that have an important role in the organisation of road transport (Schermers et al., 2015).

The Roads and Road Traffic Department

The Roads and Road Traffic Department is responsible for road network planning and for the design construction and maintenance of road infrastructure. The Roads and Road Traffic

Department is also active in drafting of specifications and standards, funding, contracting, monitoring and quality control. The Roads and Road Traffic Department applies various road design standards, which have been developed for local conditions. These road design standards were originally based on international standards. However, these standards have been adjusted to fit the Moroccan situation.

Ministry of Equipment, Transport and Logistics, Department of Road Transportation Safety (DTRSR)

The DTRSR is mainly in charge of road transportation safety in general and for the safety of vehicles and drivers. This department administers vehicle permits, testing and registration. It is also responsible for driver licensing and testing.

The Department of Studies, Planning and Coordination

This Department focuses and is responsible for the planning and development of the road transport sector, for the coordination between various modes of transport in the country and for the transportation information system.

While Morocco does have important departments that focus on the road safety system, Morocco lacks the presence of a dedicated road safety research programme carried out by a dedicated research staff and backed by sustainable funding sources. This is important to review and research the data that is gathered (Schermers et al., 2015).

Pillar 2: Roads and mobility

Road conditions play an important part in road safety systems, with more than 70% of fatalities and seriously injured casualties occur on rural roads. The road network of Morocco covers about 61.000 kilometres, of which 41.105 kilometres are asphalt surfaced. This road network accommodates around 90% of the country's mobility need and 75% of the transport of goods requirements (Schermers et al., 2015). According to the Minestère de L'Equipement et du Transport 2012, 9.816 kilometres of the asphalt roads are categorised as highways, 22.068 kilometres as provincial roads and 9.221 kilometres as regional roads. Of the 9.816 kilometres of highways, about 800 kilometres consist of dual carriageways. On a daily basis around 88.500 million vehicle kilometres are travelled on the paved network of Morocco. Of the total amount of vehicle kilometres that are travelled on the paved network, around 67% are travelled on highways, 18% on regional roads and 14% on provincial roads (Schermers et al., 2015).

Road conditions do vary by season. During periods of heavy rainfall, road sections can wash away and create large pot holes. Heavy rainfall also contributes to less visibility and especially make road markings less visible. Roadways in mountainous areas can get closed in wintertime due to heavy snow (OSAC Country Council Information, 2014b).

The Directorate of Road Transport and Road Safety (DTRSR) is responsible for the management of road safety. This department recently applied safety measures to improve road safety. They improved the Infrastructure with identification and elimination of so called 'blackspots', the

installation of protective barriers and the construction of bicycle paths. These safety measures are likely to contribute to better road safety (OECD/ITF, 2016).

Pillar 3: Vehicles

The lack of applied vehicle standards results in unsafe and non-standard vehicles using public roads. Vehicles in Morocco are relatively old. It is estimated by the SWOV that 75% of the vehicle fleet are 10 years and older. Many cars and trucks are poorly maintained and especially the trucks are often overloaded. It is common to see trucks overturned or broken down along highways (OSAC Country Council Information, 2014b).

In Morocco, commercial vehicles and taxis have an annual inspection and buses are inspected every six months. For passenger cars these annual technical inspections are compulsory after five years. It is not known what percentage of crashes is caused by a mechanical failure. In Rabat approximately 10% of crashes are the result of vehicle defects. Older cars that are more than 12 years old are more often involved in crashes than newer cars (Schermers et al., 2015).

Pillar 4: Road users

More than half of the fatalities are represented by vulnerable road users such as pedestrians, cyclists and motorcyclists. Pedestrians are the main victims of traffic crashes followed by car occupants and motorcyclists. According to the OECD and ITF people between the age of 25 and 64 over-represent the number of road fatalities. This is the economically active segment of the population and could be related to higher exposure and more travel. Being more on the road in certain traffic peaks increases the chance of a road accident.

In Morocco it is forbidden to drive under the influence of (illicit) drugs. However, this measure is not yet enforced. While Morocco is predominately a Muslim country, alcohol is still available for purchase and consumption in many cities and places across Morocco. In 2013, alcohol use was cited as a contributing factor in 2.3% of all road crashes. National drink-driving laws have been developed and adopted (OECD/ITF, 2016).

Pillar 5: Post-crash response

Morocco does have an emergency telephone number but lacks emergency room injury surveillance systems (World Health Organisation, 2015b). Recently the ambulance fleet of Morocco was modernised and improved together with the creation of the emergency medical rescue system (SAMU) and the mobile medical emergency services (SMUR) created in regional hospital centres (OECD/ITF, 2016).

Road Safety in Oman

Introduction

Oman has a total land area of 309.500 square kilometres, a population of around 3.6 million people and approximately 1.1 million registered vehicles. The country has a serious road safety problem with approximately 913 road traffic fatalities reported in 2013. Based on World Health Organization (WHO) estimates the mortality rate in Oman is equivalent to a rate of 25,4 road

fatalities per 100.000 people, which is quite high compared to other countries (World Health Organisation, 2015b).

The vehicle population in Oman comprises primarily 4-wheeled light vehicles (84%) with the rest of the vehicles being buses, trucks and motorised 2 and 3-wheelers. Compared to other Islamic countries in Asia and Africa, Oman has a very low percentage (0,5%) of registered motorized 2- and 3-wheelers (World Health Organisation, 2015b).

The Sultanate of Oman is an oil rich Arabian Gulf country. The abundance of oil and gas and the high oil prices changed the economy and life style of the people of Arabian Gulf countries, including Oman, as the GDP and the per capita income grew rapidly grew. With a gross per capita national income of 25,150 US dollars (Mazharul Islam & Al Hadhrami, 2012; World Health Organisation, 2015b), the country is considered a high income country by the WHO.

Road safety data

The Royal Oman Police is the sole authority responsible for recording, analysing and publishing data related to traffic accidents in Oman. However, like in most countries, not all crashes are reported and it is likely that the actual numbers of crashes are higher than reported by the Royal Oman Police. A lot of minor accidents cases are settled by the parties mutually at the scene so no report is made (Mazharul Islam & Al Hadhrami, 2012).

In 2013 the Research Council completed the road accidents database, which was in collaboration with the Transport Research Laboratory (TRL, UK). The database contains data over a period of five years and will provide statistics and information on road accidents. Data regarding the causes of traffic deaths, which is gathered from the hospitals, is also critical in reducing death and injury. Once the data is operational and validated, countermeasures can be developed and evaluated.

Pillar 1: Road safety management

Road safety still is a concern in Oman and the Sultanate of Oman is committed to reduce road fatalities by 25% by 2020. To achieve this and to address the road safety problem in the country, a Research Council was created as part of its road safety strategy. The Council encourages researching all areas of road safety in the country. The road safety research program is a collaborative effort between The Research Council and the Royal Oman Police. The main objective of the program is to promote scientific research and to build national research capacity in road safety as well as to support decision makers through conducting different activities outlined by the program. A steering committee has been formed to ensure that research is of high scientific quality and that the research proposals determine the research priority areas.

The national seat-belt laws have recently been revised to be applicable to both drivers and passengers of 4 wheeled motorized vehicles. There is also a new national child restraint law and mobile phone law while driving, addressing critical gaps in legislation.

Pillar 2: Roads and mobility

Urbanisation in Oman occurred rapidly in the 21st century, changing the distribution of the population with intensive migration from remote rural areas to more developed urban areas (Plankermann, 2013). This has placed urban infrastructure under intense pressure, particularly transport infrastructure. Overall road construction programs have increased in the last twenty years. This resulted in an increase of paved roads by more than 25.000 kilometres (Mazharul Islam & Al Hadhrami, 2012). Most of the major urban roads are now dual carriage roads, well equipped with signals, traffic signs and also lighting. However, travel between cities, especially at night, may be dangerous because of poor/no lightning, wandering livestock, pedestrians crossing highways, slow moving cargo vehicles and speeding drivers (OSAC Country Council Information, 2014c).

The study of Siham Gaber Farag of 2014 shows the distribution of injury and non-injury crashes over the months in 2010 vary throughout the year. The high number of crashes between July and September can be caused by the tourist season and monsoons. This period of intense rainfall can wash out roadways and make road markings less visible (OSAC Country Council Information, 2014c; Plankermann, 2013; Siham Gaber Farag, Ibrahim H. Hashim & El-Hamrawy., 2014).

Most of the accidents happen during the day between 9.00 and 16.00 and 17.00 and 20.00, typical for peak hours with people travelling to and from work. Thursday, which is weekday holiday in Oman, has the highest frequency of crashes. This has to do with people visiting family and friends, the abundance of private cars and the overloading of the road network which often leads to fatal accidents (Mazharul Islam & Al Hadhrami, 2012).

Pillar 3: Vehicles

According to the WHO there are no vehicle standards applied to vehicles using public roads in Oman (World Health Organisation, 2015b). There are no legislated frontal impact standards, electronic stability control and pedestrian protection standards in force. However, periodic vehicle maintenance is mandatory in Oman and vehicles must meet local standards.

The study of M. Mazharul Islam et al. indicates that over the period 2000 to 2009, the population of Oman increased by about 2,0% per annum, while the automobile fleet in the country increased by 4,3% per annum. Over the same period, the registration of new motorised vehicles increased by 10% per annum. The increase in private cars and shared private taxi services is caused by the unavailability of a good railway network, water-ways or bus services. Thus, the excessive dependence on private cars leads to heavy traffic, a large number of accidents, degradation of urban environment and high individual expenditure on transport.

Private cars are involved in 77% of all road crashes according to Siham Gaber Farag. However, since motorized 4-wheeled vehicles account for 84% of the total vehicle fleet (WHO report 2015), it is no coincidence that private cars are involved in most road accidents.

Pillar 4: Road users

Economic growth and the rapid increase in income levels has impacted vehicle ownership levels and contributed to a rapid growth of motorised vehicles in the country. However, increased vehicle ownership and use has not been adequately supported by proper education and awareness campaigns about the traffic risks and consequences of traffic accidents and this is reflected in the growing road safety problem.

Young drivers are over-represented in crashes in Oman, with 70% of the crashes involving drivers aged from 17 to 36 years whilst they represent roughly 45% of the population. To improve the road safety in Oman it is crucial to understand the young novice driver's risky driving behaviour and risk perceptions (Mazharul Islam & Al Hadhrami, 2012). Speeding is a major contributing factor.

Pillar 5: Post-crash response

For the patient's survival the time between injury and initial stabilization is an important factor. To minimize road accident fatalities, prompt emergency assistance and efficient trauma care management are of great importance. Oman does have an emergency telephone number and emergency room injury surveillance systems with qualified personnel.

Asian Region

Road Safety in Indonesia

Introduction

Road safety is a very serious problem in Indonesia. In 2013, 26,416 road traffic fatalities were reported and is showing signs of declining when compared to 2011 and 2012. However, these are registered fatalities and crashes.

Given the population of Indonesia, this gives a mortality rate of 15.3 road fatalities per 100,000 people (WHO 2015). This is an increase when compared to the rate that was documented in 2010 (12.1 fatalities per 100,000 people). However, the WHO considers these figures to be an underestimate as traffic crashes are underreported, data are inconsistent and difficult to verify (Indonesia Infrastructure Initiative, 2010; World Health Organisation, 2015b) .

Indonesia comprises a geographic area of 1,919,317 km^2 with a population of around 250 million people and about 104 million registered vehicles in 2013. Of the motorised vehicles about eighty three percent are motorised 2- and 3-wheelers and the rest are vehicles of different categories such as cars, jeeps, buses, trucks etc. (Indonesia Infrastructure Initiative, 2010).

The World Health Organization report of 2015 mentions that there is an estimated GDP loss of 2.9% to 3.1% due to road traffic crashes. The data also shows that 58 percent of the traffic related deaths are among vulnerable road users: e.g. pedestrians (21%), cyclist (2%) and riders of motorised 2- or 3-wheelers (36%). It is important to note that 35 percent all traffic fatalities are registered as occupants or drivers of buses (Indonesia Infrastructure Initiative, 2010).

Road Safety Data

To get a better insight in the road safety, organised data is very important. Indonesia has a new data system named the IRSMS Accident Information System. IRSMS is designed to provide valid, reliable and verified data for road accidents in Indonesia. Access to comprehensive, reliable and accurate road accident data makes it possible to identify specific roads, vehicles and road users which need to be targeted with road safety interventions (M. Naufal Yahya et al., 2013).

At present, data is collected by police filling in a notebook entry or a paper accident report form at the accident site. This information is later entered in the database at the police station. The information that is entered is mostly the location of the accident, geographical coordinates, name of the road, photographic evidence and recordings of witness statements. Additional documents can also be attached to the accident record. Output from the system is designed to serve for prosecution, investigation, planning and accident analysis purposes. Thus, it is very important for the police to be present at the accident site to gather the actual data.

Pillar 1: Road safety management

Indonesia plans to reduce the traffic fatalities to less than 13,200 deaths by the end of 2020. A five-year program of action was established with assistance from the World Bank, the AusAID-funded Indonesia Infrastructure Initiative, the Asian Development Bank, and other stakeholders (Arwar, 2014). A particular priority is for road safety partnership actions among stakeholders to improve capacity by strengthening coordination and management of road safety. There are some programs that have a high priority since the demand is great (M. Naufal Yahya et al., 2013). These programs include:

- The improvement of traffic education for children and the improvement of the system for issuing driver licenses.
- Testing new traffic police actions, including speed enforcement and the drunk driving / drug driving enforcement.
- Studies of locations with a high number of crashes to have a better insight in making decisions regarding road safety engineering.
- Improvement of the traffic accident data recording system and improving the quality of traffic accident investigations.

The Indonesian National Police has an independent agency called the Indonesian National Traffic Police Corps. This police corps is tasked with addressing and enforcing road safety in Indonesia. While there is training capability at the Police Academy in Semarang and at the Traffic Education Centre near Jakarta, operational traffic policing capability can be improved to detect, containing and reducing illegal road behaviours and to change inappropriate or risky behaviours (M. Naufal Yahya et al., 2013).

The Government of Indonesia drafted the National General Plan for Traffic and Road Transportation Safety and released it on 11 May 2011. This general plan reflects the goals outlined for the UN Decade of Action for Road Safety and incorporates the five pillars listed in the Decade of Action There are a number of activities envisaged and undertaken under the Road

Safety Management Pillar. The establishment of Law 22/2009 has been an important activity. This law is generally for the Indonesian National Traffic Police Corps (INTPC). Under the law, the INTPC is charged with the responsibility for road traffic and transport safety (M. Naufal Yahya et al., 2013).

Furthermore, the inclusion of the Provincial and Regency/City Governments in the law, is an important step ensuring that all levels of the government take an active role in road safety. Another major role for the Indonesian Government is to target the business sector and civil society to take more responsibility for remedial measures to improve road safety and to promote road safety information. Bringing leaders in Indonesian society, such as imams and other religious leaders, into the campaign on road safety can be a very efficient way of creating road safety awareness.

Pillar 2: Roads and mobility

Road conditions are an important factor for the road safety in Indonesia. The road environment can influence traffic accident probability according to the data given by the Ministry of Transportation. There are certain environmental factors that influence road safety. The traffic flow on the roads has a strong effect on the speed of road users. The traffic flow depends on the vehicle types, speed limit and the road quality. The weather is also an important factor on the road safety. Indonesia experiences extremely wet days and there can be a lot of dense fog. These factors directly affect the road users and the (unpaved) roads (Arwar, 2014).

Two of the most critical failings at roadwork sites in Indonesia is the failure to use any advance (road works) warning signs to warn approaching drivers of the workers ahead, and a lack of adequate demarcation signs and markings to protect road workers at the work zone. Some of these signs are only placed one meter away from the workers.

Another safety concern is the lack of sealed road shoulders along Indonesian roads. Most of the roads have unsealed shoulders and have deep drop offs from the road pavement. Sometimes these drop offs can have a depth of twenty centimetres, putting road users in great danger. Particularly motorcyclists are prone to crashes should they suddenly have to leave the road in order to avoid other road hazards such as oncoming trucks or buses, or potholes(Indonesia Infrastructure Initiative, 2010) .

Road conditions in Indonesia are far from ideal. For road safety development there are two types of treatments: short term and long term countermeasures. On the one hand, the short term countermeasures are low cost improvements which can be carried out immediately and have direct impact. These countermeasures include routine maintenance (e.g. cutting the vegetation which obstructs sight distance, covering ditches, removing roadside hazards, patching potholes, etc.), installation of proper safety devices (e.g. markings, crash barriers, etc.). Funding would not be a major problem since these countermeasures are low-cost. However, creating the awareness to perform such improvements by road authorities is the real challenge. On the other hand, the long term countermeasures, such as realignment of the road, planning new infrastructure and

capacity building, require appropriate planning, funding and willingness of the road authorities (Ecorys, 2011).

Pillar 3: Vehicles

Like many Asian countries, Indonesia has a large population of 2- and 3-wheel vehicles. Some 83% of all registered vehicles in 2013 were motorized 2- and 3-wheelers. Motorized 2-and 3-wheelers offer little or no protection to riders and passengers and the risk of serious injury in the event of crashes is high. The use of non-standard and unsafe vehicles contributes to a high number of accidents. Over involvement of buses and trucks are the main factors of accidents with buses and trucks. The main reasons that there are a lot of non-standard and unsafe vehicles in use is that there are no applied vehicle standards (Indonesia Infrastructure Initiative, 2010). There are no frontal impact standards, electronic stability control and pedestrian protection empowered.

Vehicles with faulty brakes are a common cause for traffic crashes marked with "severe injury". While faulty brakes are a common cause for fatal traffic accidents, ignoring warning lights of the vehicle (e.g. tyre pressure, engine oil level and temperature warning) also contributes to traffic accidents. Some people ignore these warning and indication light because they think they are probably malfunctions (Arwar, 2014). Every vehicle is supposed to have a proper certification, given by the local transportation agency, before going on the road. The risk of having an accident is quite high, so law enforcement needs to set strict rules for lawbreakers (Arwar, 2014; Indonesia Infrastructure Initiative, 2010).

Pillar 4: Road users

The majority of traffic fatalities are registered among bus drivers and passengers (35%), riders of motorised 2- or 3-wheelers (36%) and pedestrians (21%) (World Health Organisation, 2015b). Data from Indonesia shows an increase in the number of vehicles, and an increase in the number of crashes. Young people (10-24 yr.) and people of productive ages (25-50 yr.) account for a large proportion of accidents. A majority of accidents affect individuals who ride motorbikes and make use of the public transport. Traffic accidents can also reflected in an increase in the number of poor people, especially those widowed or without a family breadwinner (Arwar, 2014).

Human factors such as carelessness, fatigue, lack of skill, drunkenness, speeding, proximity to other drivers and jaywalking, have become predominant factors in road crashes. This suggests that public awareness of traffic is needed, especially for people in their productive ages. A large number of motorcycle drivers are using their motorcycles either without having or carrying a driving license (Arwar, 2014).

Post-crash response

The time between injury and initial stabilisation is an important factor in the patient's survival chance. Thus, prompt emergency assistance and efficient trauma care management are clearly important in minimizing the road accident deaths. Indonesia does have multiple emergency

telephone numbers and a few basic emergency care centres at hospitals. However, these emergency care centres are only located at hospitals in urban areas. The lowest level of emergency care is found in the rural areas, where most facilities are community-based and provide only service for primary health care.

African Region

Road Safety in Cameroon

Introduction

Cameroon, a country having a total land area of 472,710 square kilometres and a population of around 22 million faces a serious road safety problem. In the year of 2013 approximately 1,095 road traffic fatalities were reported (World Health Organisation, 2015b). The total road traffic fatalities might be higher since not all fatalities are reported. The World Health Organization estimated 6,136 road traffic fatalities for 2013, equivalent to a rate of 27.6 road fatalities per 100,000 people and significantly higher than countries with comparable income levels.

No recent data is available of the total registered vehicles in Cameroon. However, the WHO report of 2010 mentions that Cameroon has about 443,018 registered vehicles in 2010 indicating a relatively low rate of vehicle ownership. Of the motorized vehicles about forty five percent are cars and fifty percent are motorized 2- and 3-wheelers. The rest of the total registered vehicles are heavy trucks, buses and other motorized vehicles.

The World Health Organization report estimates that road crashes cost the country approximately 1% of its GDP. The data also shows that the reported road traffic deaths stays relatively constant over the years. However, this might not be realistic since the crash registration is very poor and unreliable.

Road safety data

In Cameroon, motorcycles and automobile occupants share more or less the same amount of road users, while pedestrians account for 34% of the total amount of road users. Like more African countries the working age group (15-45 years) are involved in more crashes with motorized vehicles than other age groups. This probably has to do with the vast amount of usage of motorised vehicles on working days.

Pillar 1: Road safety management

A large percentage of the population has not received any formal driver training. Many drivers' licenses are can be easily obtained and are not always legally valid.

The main problems for the enforcement of laws in Cameroon are the numerous individual operators, ambiguous laws and lack of transparency in the administration of penalties. Another major problem in Cameroon is that financial penalties are often inadequate deterrents. Fines for offences, such as excessive speed, license infringements, or operation of un-roadworthy vehicles

are often regarded as normal operating expenses by drivers. This is a result that the penalties are not severe enough to dissuade traffic infringements (Minang, 2014).

Pillar 2: Roads and mobility

Most of the maintenance activities are poorly planned and ineffective in optimizing the life cycle of road assets. As a result the ineffective maintenance has led to poorly maintained roads. Traffic volumes are generally low when compared to other middle income countries. Traffic over the paved network is only 1,099 vehicles per day, against 2,558 in other middle-income countries. The primary paved road network shows some king of over-engineering with fewer than 300 vehicles per day making use of it. However, the traffic volumes on the unpaved roads justifies the paving of the road network. Around 36 percent of the unpaved road network in Cameroon carries more than 300 vehicles per day (Dominguez-Torres & Foster, 2011). The poor condition of the road network prohibits the easy movement of goods and this is a major barrier for connecting manufactures and consumers with international markets. This makes Cameroon one of the least efficient countries when it comes to transportation.

Pedestrians and livestock share the same roads as the motorised vehicles resulting in a constant road hazard, especially at night. Large logging trucks, as well as other vehicles, travel the roads after dark. Often these vehicles travel without lights and are frequently broken on the side of the road or even on the road. With barely any road signs and no road lightning, roads in Cameroon are dangerous at night. Some parts of the road network in Cameroon contribute to a lot of traffic accidents. Especially the more complex parts in the road network are prone to a lot of traffic accidents. One of these parts is the Douala-Yaounde-Bafoussam-Douala triangular road network. This part of the road network contributes to an average of 100 registered deaths per month according to the Cameroon Road Safety Foundation (Minang, 2014).

Like a lot of other central African countries, motorised traffic increases during festive and seasonal periods. According to the Bafia Mobile Gendarmerie Road Safety Unit, road traffic volumes increase especially during August and December, as do the number of road crashes. The untarred roads in Cameroon also results in accidents that are caused by the dry and wet season. During the dry season, road users grapple with excessive dust which causes visibility problems. In the rainy season road users are sometimes forced to use the wrong lane of the road because of mud or potholes (CONSIA Consultants, 2013; OSAC Country Council Information, 2014a)

Pillar 3: Vehicles

Vehicles in Cameroon require no inspection for roadworthiness and there are no known applied vehicle standards. This is one of the primary reasons that there are a lot of non-standard and unsafe vehicles in use. The use of the poorly maintained vehicles contributes to a high number of accidents (World Health Organisation, 2015b).

Trucks in Cameroon are poorly maintained. Second-hand trucks are typically overloaded and travel at excessive speed to obtain maximum revenue from their restricted usage. The

overloaded and poorly maintained trucks are prone to roll-over crashes and are a constant threat to other road users (Dominguez-Torres & Foster, 2011) .

Pillar 4: Road users

In Cameroon, males are at an increased risk of road traffic accidents compared to females (Jolion McGreevy et al., 2014). Drinking and driving are a major problem after dark. Social activities and several religious activities take place in the weekend leading to an enormous pressure on the roads and often resulting in fatal crashes. Most youths have limited driving experience and in the weekends they often drive at night and can be drunk while driving. Commercial drivers often disregard traffic safety when they try to recoup weekend expenses and therefore overload passengers and increase speed to complete more trips.

Human error such as fatigue, lack of skill, drunkenness, speeding and carelessness are major factors for traffic crashes (Dominguez-Torres & Foster, 2011). There is an evident need for public awareness of traffic and safe driving. Thus, the government of Cameroon has launched intense road safety campaigns, strengthened enforcement strategies, driving school standardisation programs and introduced medical exams for commercial drivers (CONSIA Consultants, 2013).

Pillar 5: Post-crash response

The number of fatalities among vulnerable road users in Cameroon is probably far higher than registered. It is likely that vulnerable road users who die at the scene are transported to the morgue rather than the hospital. This suggest that the number of deaths observed in the hospital (on which the registration data is based) are underestimated (Jolion McGreevy et al., 2014).

The time between injury and initial stabilisation is an important factor in the patient's survival (the so called golden hour). Prompt emergency assistance and efficient trauma care management are clearly important in minimising the injury consequences resulting from crashes. Cameroon does have multiple emergency telephone numbers but lacks emergency room injury surveillance systems (OSAC Country Council Information, 2014a).

Reports of road crashes are channelled mainly through several informal and unstructured media. Currently, only one toll free emergency line is designated for crash/incident reporting. The location of the crash is then directed to a FRSC (Federal Road Safety Corps) patrol vehicle that is nearest to the crash scene. The data is collected by people of the FRSC filling in a notebook entry or the paper accident report form at the accident site (Minang, 2014).

Road Safety in Nigeria

Introduction

Nigeria has a total land area of 910,771km^2 and a population of around 174 million people. In 2013 approximately 6,450 road traffic fatalities were reported. However, this number is likely to be an underestimate as not all traffic accidents are reported. The World Health Organization

estimated 35,641 road traffic fatalities for 2013, given the population this is equivalent to a mortality rate of 20,5 road fatalities per 100,000 people (World Health Organisation, 2015b).

In 2013 Nigeria had about 5,791,446 registered vehicles. Of the motorized vehicles about 56 percent are cars and 4-wheeled light vehicles and 44 percent are motorised 2 and 3-wheelers. The number of buses and HGV were not reported in the WHO report (World Health Organisation, 2015b).

The World Health Organization report of 2015 estimated that road crashes cost the country an equivalent of 3% of its GDP. The WHO data also show that there appears to be an increase in reported road traffic deaths. This trend might be explained due to a better road fatality reporting system, an increase in the total amount of traffic deaths or both. It is important to notice that there is no data available for deaths by road user category.

Pillar 1: Road safety management

Nigeria plans to reduce traffic fatalities irrespective of projected increases in traffic volume(Federal Road Safety Corps, 2014) . The World Bank will assist Nigeria in providing manpower and operational equipment to conduct a road safety assessment on six major corridors. The results of the assessment have led to the establishment of sixteen additional Federal Road Safety Corps (FRSC) Command Units but, most significantly, to a consistent decline, between 2011 and 2013, in road fatalities despite increased motorisation on the corridors, as detailed in the table below:

A five-year action program, the Nigeria Road Safety Strategy (NRSS), was established. This strategy will focus on decreasing the current road traffic crash fatality by 50% in 2016. To achieve this goal the following strategies have been formulated (Sumaila, 2013):

- To establish a cohesive and efficient road safety system.
- To provide road infrastructure that accommodates the needs of all road users.
- To ensure all vehicles on Nigerian roads meet defined standards.
- To instill a culture of personal responsibility for safe road use.
- To deliver prompt and effective response to road crashes.

One of the most important stakeholder organisation is the Arrive Alive Road Safety Initiative. The goal of this initiative is the prevention of the high rates of motor vehicle crashes and fatalities in Nigeria. The intervention plan was developed based on education/awareness, safety enforcement, advocacy/legislation and road improvement. The initiative is mainly active in the more populated parts of the country and focuses on driving under the influence, motorcycle safety, speeding, child passenger safety, pedestrian safety, truck safety and distractive driving.

The main problems for law enforcement in Nigeria are the numerous individual operators (e.g. organized transport, private companies, federal and local government institutions), ambiguous laws and lack of transparency in the administration of penalties. Another major problem in Nigeria is that financial penalties are often inadequate deterrents.

Fines for offences such as excessive speed, license infringements, or operation of un-roadworthy vehicles are often regarded as normal operating expenses by drivers. Most drivers prepare for such fines by setting funds aside at the start of operations to sort their encounters with road safety officials. This is a result that the penalties are not severe enough to dissuade traffic infringements (Sumaila, 2013).

Pillar 2: Roads and mobility

In 2011, Nigeria had an estimated road network comprising a length of about 194.000 kilometres, the second longest network in Africa (Sumaila et al., 2013). Given the relatively large geographic area, the road network is relatively sparse. With a large population of people and relatively high car ownership (7,6 million vehicles) this results in intense traffic pressure on the road network in Nigeria (Sumaila, 2013; Ukoji, 2014).

The urbanisation of Nigeria has taken a significant impact on fatal road crashes. The fast growing cities and the high rate of rural-urban migration increased the pressure on urban infrastructure, particularly transportation. Large metropolitan areas (e.g. Lagos, Kano, Ibadan, Kaduna etc.) face new problems that are typical to cities facing increasing traffic demand and congestion. The general impatience and ill-tempered nature of road users and conflicts between pedestrians and other road users also contribute to a high number of crashes (Ukoji, 2014).

There are particular months where the number of traffic fatalities are significant higher than other months. Compared to other months, December, March, July and April have the highest number of traffic fatalities. . This mainly has to do with festive and seasonal periods in these months. For example Christians celebrate Christmas in December and Easter in April or March. Within these period people travel a lot to celebrate with their family (Federal Road Safety Corps, 2013; Ukoji, 2014)

The high number of traffic fatalities in July is affected by the rainy season, when road markings are less visible, bridges collapse, trees fall and rivers flood. Other environmental factors include Harmattan winds, sun reflection, heavy winds, pot holes and unsurfaced roads (Ukoji, 2014).

The government's inability to appropriately budget and monitor road construction and maintenance contributes to fatal crashes. Criminal networks have also taken advantage of poor road conditions on certain highways to set ambushes to rob travellers, causing fatal car accidents in the process (Ukoji, 2014).

Pillar 3: Vehicles

The use of non-standard and unsafe vehicles contributes to the high number of crashes in the country. The main reason that there are a lot of non-standard and unsafe vehicles in use is that there are no applied vehicle standards (World Health Organisation, 2015b).

The study of Ukoji 2014 shows that between June 2006 and May 2014, cars, buses and lorries/trucks are involved in more recorded road crashes than the other vehicle types.

Transportation with tankers and trailers has increased since the discovery of oil in Nigeria. Between 2007 and June 2010, a total of 4.017 tanker/trailer crashes were recorded on Nigerian roads, resulting in 4.076 persons being killed in crashes involving petrol tankers. Commercial vehicle owners task their drivers to generate more profit, therefore the drivers tend to drive as fast as possible in poorly maintained vehicles resulting in more accidents (Ukoji, 2014).

Minibuses are the most popular means of travel for intercity transportation in Nigeria, resulting that fatal accidents involving minibuses are most prevalent on highways. Most of the accidents that involve lorries and trucks also occur on highways, given the fact that they transport agricultural products to cities (Ukoji, 2014). For intra-city transportation in Nigeria, cars are also popular. However, poor vehicle maintenance and inability to observe safety measures often lead to fatal accidents. Most of the crashes involving cars were reported in metropolitan areas.

Mechanical and vehicle related factors that can result in fatal road accidents include un-roadworthy vehicles, poor vehicle maintenance, tyre blowouts, poor lights and broken-down vehicles on the road without proper warning signs (Ukoji, 2014). The government of Nigeria has introduced a few measures to improve vehicle safety. There is for example a free safety check for all vehicles on the highway. Defects are identified and brought to the attention of the owners of the vehicles without the issuance of tickets, penalties or fines. In 2014 more than 230.000 vehicles were checked under this arrangement. The introduction of speed limiters on commercial vehicles as well as the implementation of a standard school bus design might contribute to safer vehicles in Nigeria(Federal Road Safety Corps, 2014) .

Pillar 4: Road users

The poor driving culture in Nigeria is generally acknowledged. The utter disregard by road users for traffic laws underlined by the strong religious belief of many Nigerians contribute to the poor driving culture (Sumaila, 2013).

Most of the fatal road accidents occur in weekends and on Mondays according to Sumaila, 2013. This is partially the result of social activities and several religious activities that take place over the weekend. Most youths have limited driving experience and in the weekends drink-driving and night-time driving further impairs their driving ability (Sumaila, 2013; Ukoji, 2014). On Mondays drivers from transport companies may try to recoup weekend expenses when they overload passengers and speeding to complete more trips.

Human error such as fatigue, lack of skill, drunkenness, speeding and carelessness have become the main contributing factors for traffic crashes (Federal Road Safety Corps, 2013). In addition, public awareness of traffic and safe driving is needed. Thus, the government of Nigeria has launched intensive road safety campaigns, strengthened enforcement strategies, driving school standardisation programmes and introduced medical exams for commercial drivers.

Pillar 5: Post-crash response

Nigeria does have multiple emergency telephone numbers but lacks emergency room injury surveillance systems (Ukoji, 2014). Currently, only one toll free emergency line is designated for

crash/incident reporting. In 2015 the Nigerian government introduced 20 new Mobile Care Units and 26 new transport ambulances that will be stationed at the 26 general hospitals.

The Federal Road Safety Corps is expanding their fleet with more ambulances and tow trucks and they establish emergency ambulance points along major corridors. The collection of road accident data is very important to have a complete overview of the road safety problems. With outdated road accident reporting systems a lot of accidents are not reported giving an incomplete and false overview. To solve road safety problems and understanding of the road accident situation is required and complete data is needed. The FRSC is collaborating with the Federal Ministry of Health for the collection of injury data and the FRSC is introducing the new template for the collection of road traffic crash data.

Reports of road crashes are channelled mainly through several informal and unstructured media, including the emergency toll free line. The location of the crash is then directed to a FRSC (Federal Road Safety Corps) patrol vehicle that is nearest to the crash scene. The data is collected by people of the FRSC filling in a notebook entry or by the police filling in the paper accident report form at the accident site (Sumaila, 2013).