

IN METROPOLITAN CITIES OF PAKISTAN

**ROAD  
SAFETY**

# **ROAD SAFETY**

**IN THE METROPOLITAN  
CITIES OF PAKISTAN**

**MUHAMMAD ZAMAN  
IMRAN SABIR**

**SCHOOL OF SOCIOLOGY,  
QUAID-I-AZAM UNIVERSITY ISLAMABAD PAKISTAN**

**FINANCED BY  
HIGHER EDUCATION COMMISSION OF PAKISTAN**





## RESEARCH TEAM

**Hifza Irfan**  
Research Fellow

---

**Rafia Arshad**  
Research Fellow

---

**Muhammad Farooq**  
Research Fellow

---

**Sadia Aslam**  
Research Fellow

---

**Zaeem Mujahid**  
Volunteer

---

Copyright © 2023 by Muhammad Zaman/Imran Sabir All rights reserved.

Second Edition

No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in reviews and certain other non-commercial uses permitted by copyright law.

Printed by the School of Sociology, Quaid-i-Azam University, Islamabad

First Printing, 2021

ISBN 978-969-23612-1-7

Project Web: <http://rs.qau.edu.pk>

# ROAD SAFETY

## IN METROPOLITAN CITIES OF PAKISTAN

## TABLE OF CONTENTS

List of Abbreviations .....	4
<b>PART I</b> .....	5
Executive Summary .....	6
1. Introduction.....	8
1.1 Objectives.....	10
2. Review of literature and road safety policies.....	11
2.1 Road Crashes .....	11
2.2 Public Health and Road Crashes.....	12
2.3 The State of Road Safety in European Countries.....	13
2.4 Road Safety in United States of America.....	15
2.5 Road Safety in Latin America.....	16
2.6 Road Safety in Australia.....	16
2.7 Road Safety in African Countries.....	17
2.8 Road Safety in Asian Countries.....	18
2.8.1 China.....	19
2.8.2 India.....	20
2.8.3 Afghanistan .....	21
2.8.4 Iran .....	21
2.8.5 Bangladesh .....	22
2.8.6 Pakistan.....	23
3. Research Methods .....	29
3.1 Study Design .....	29
3.2 Fieldwork Experiences.....	31
3.3 Ethical Considerations .....	32
4. Results .....	33
4.1 Knowledge about Road Safety.....	33
4.2 Driver's Attitude towards Road Safety .....	34
4.3 Commuters' Attitude towards Road Safety.....	35
4.4 Perceived Causes of Road Accidents.....	36
4.5 Drivers' Road Safety Practices .....	36
4.6 Pedestrians' Practices of Road Usage.....	37
4.7 Road Safety Trainings and Awareness .....	38
4.8 Driving License Mechanisms.....	38
4.9 Accident History.....	39
4.10 Fastening the Seat Belt by Age .....	40
4.11 Knowledge of Speed Limit in Residential Areas by drivers' Age .....	41

4.12	Possession of Driving License by Professions .....	42
4.13	Holding of Driving License and Driving Experience.....	43
4.14	Fastening the Seat Belt and Driving Experience.....	43
4.15	Possession of Driving License in Metropolitan Cities of Pakistan .....	44
4.16	Holding Driving License and Fastening the Seat Belt.....	45
<b>PART II</b>	.....	49
	Policy Interventions: Proposed Models for Road Safety.....	50
	Model 1 .....	50
5.1.	Smart Parking Model for Islamabad.....	50
5.1.1	Smarts Plans of Vehicle Parking.....	50
5.1.1.1	Multi-Story Parking Plazas.....	50
5.1.1.2	Possibilities of Developing Feasible Models .....	51
5.1.1.3	QR Code.....	51
5.1.1.4	Usage of QR Coupon .....	52
5.1.1.5	Bar Code in Parking Lot .....	53
5.1.1.6	Temporary Parking.....	53
5.1.2	Mobile Application for Smart Parking .....	53
5.1.2.1	Advance/ Pre-booking.....	53
5.1.2.2	Feasibility .....	53
5.1.2.3	Multi-Storey Parking Plazas.....	54
5.1.2.4	Introduction of Technology in Smart Parking .....	54
5.1.2.5	Estimations from Private company .....	54
5.1.2.6	Public Sector Estimation .....	55
5.1.3	Output.....	55
	Model 2 .....	56
5.2	Centralized Public Transport System in Islamabad.....	56
5.2.1	Introduction .....	56
5.2.2	Objectives.....	56
5.2.3	Main Idea of the Project.....	56
5.2.4	Details of Public Institution and Transport System.....	57
5.2.5	Public Transport System .....	58
5.2.6	Major Roads and their Length .....	58
5.2.7	Sectoral Details.....	59
5.2.8	Existing Routes of Islamabad.....	60
5.2.9	Islamabad Map.....	61
5.2.10	Existing Public Transport Routes in Islamabad.....	61
5.2.11	Pre-Requisites.....	63
5.2.11.1	Legislation.....	63

5.2.11.2	Islamabad Transport Authority.....	63
5.2.11.3	Establish Quality Assurance Department.....	63
5.2.11.4	Human Resource (HR) Branch.....	63
5.2.11.5	Maintenance Branch .....	63
5.2.11.6	Finance Branch.....	63
5.2.11.7	Details Operations.....	63
5.2.12	Cost and Benefits.....	64
Model 3	.....	65
	Awareness on Road Safety .....	65
5.3	Introduction.....	65
5.3.1	Identifying the Problem.....	65
5.3.2	Implementation Issues.....	65
5.3.3	Objectives and Main Focus of the Model .....	66
5.3.4	<b>Focus of Awareness and Road Safety Model</b> .....	66
5.3.5	Traffic Education Guidelines for Children in Schools.....	66
5.3.6	Traffic Education Guideline: Goals and Content for the Youth.....	68
5.3.7	Organize Road Safety Seminars and Lectures in Colleges and Universities.....	68
5.3.8	<b>Role of Electronic, Print and Social Media</b> .....	69
5.3.9	Awareness Programs for Public .....	70
5.3.10	Ensuring Strict Law Enforcement and Deterrence .....	71
5.3.11	Creating Smart Apps on Road Safety .....	71

## LIST OF ABBREVIATIONS

GDP	Gross Domestic Product
GNP	Gross national product
NHA	National Highway Authority
AQI	Air Quality Index
NTRC	National Transport Research Centre
WHO	World Health Organization
PBS	Pakistan Bureau of Statistics
SOPs	Standard Operating Procedures
PKR	Pakistani Rupee
GT Road	Grand Trunk Road
CDA	Capital Development Authority
ARTBA	Americans Road Transportation Builders Association
BAC	Blood Alcohol Concentration
LTV	Light Transport Vehicle
HTV	Heavy Traffic Vehicles
PBS	Pakistan Bureau of Statistics
NRS	National Road Safety Strategy
VRU	Vulnerable Road User
ABS	Anti-locked Braking System
ADB	Adaptive Driving Beams

IN METROPOLITAN CITIES OF PAKISTAN

**ROAD  
SAFETY**

**PART I**

**SURVEY REPORT ON  
ROAD SAFETY IN  
METROPOLITAN CITIES  
OF PAKISTAN**

## EXECUTIVE SUMMARY

Rampant urbanization, high population density, road crashes and traffic congestion have become serious issues in the contemporary world. In terms of the incidence of road crashes, Pakistan is one of the most at-risk countries, recording an estimated 27,000 deaths each year. Owing to road crashes, it not only loses USD 9 billion per year which is equivalent to 4% of the GDP (Ministry of Communication, 2018; Zaman, 2019) but also experiences severe environmental degradation. These human and financial losses are higher than those which have been reported in the War on Terror. By 2018, the number of registered vehicles in Pakistan was recorded at 18 million with the number expected to rise up to 50 million in 2025 and up to 65 million by 2030. The current unbridled pace of urbanization and motorization has exacerbated road safety in Pakistan. Currently, the urban population in Pakistan stands at 37% which number is expected to rise by more than 50% by 2050. The population density in Pakistan is 251 per km<sup>2</sup> and up to 25000 per km<sup>2</sup> in metropolitan centers. Owing to Pakistan's singular socio-economic and socio-cultural context, the menace of road safety violations is accompanied by a lack of in-depth understanding about what causes violation of law and road user carelessness in Pakistan. The lack of scientific knowledge about road usage makes it difficult to formulate and implement suitable policy measures for improving the behavior of road users.

Along with identifying the factors involved in law breaking behavior of road users and drivers, the current study also strategizes suitable policy options to address the issue. Conducted by the Department of Sociology, Quaid-e-Azam University Islamabad in collaboration with HEC, this study found that traffic rule violations such as ignoring traffic signals, misuse of lanes, taking wrong U-turns, using mobile phones during driving and improper use of indicators were common practices amongst the commuters. This was further exacerbated by the lack of law enforcement, effective surveillance or a deterrent penalty system.

It was initially assumed by the researchers that the possession of a driving license from a recognized driving school was an important skill certificate for safe driving. However, the Knowledge, Attitude and Practices (KAP) survey conducted to understand the Knowledge, Attitude and Practices of road users in five metropolitan cities of Pakistan (Islamabad, Lahore, Karachi, Peshawar, Quetta) found that every second driver on the road (49 percent) did not possess a valid driving license. Alarming, only two percent of the motorists had attended a recognized or registered driving school to learn how to drive, while a significant majority of the drivers (58 percent) had learnt to drive from friends and family. Analyzing the road accident history of the commuters, the researchers found that a lesser percentage (32 %) of the licensed drivers had been involved in road accidents in comparison with a greater percentage (37 %) of the unlicensed drivers. Interestingly, it was found that 67 percent of the drivers in metropolitan cities of Pakistan believed that it was destiny, rather than human errors, which caused road accidents. Eighty percent of the drivers also revealed that they drove at a speed of 50 km/h or more in urban areas despite the fact that this speeding limit in densely populated urban spaces comprises over speeding. While analyzing the knowledge and practice of commuters about road safety, the study also found that 30 percent of drivers were not acquainted with the speed limits in residential areas, and that 38 percent of the respondents admitted that they did not bother about traffic signals at all. Forty nine percent of the commuters also confessed that they could not remember emergency numbers in the event of road accidents.



These findings demonstrate that road safety in Pakistan is extremely poor in terms of drivers' knowledge, attitudes and practices. To address this, robust and contextually suitable policy interventions are urgently needed. In view of the policy vacuum on road safety, this study proposes several contextually suitable policy interventions with long-term impact in regard to road safety. The study proposes a Smart Parking Prototype Model for Islamabad that includes multi-storey parking plazas to reduce traffic congestions. This model can reduce the number of vehicles on road, thus minimizing the chances of road accidents. Furthermore, a proposed Centralized Public Transport System utilizing existing transport buses of the educational institutions in Islamabad can also prove instrumental in mitigating the incidence of road accidents. Last but not least, the strict implementation of a model of effective and smart driving license issued upon the completion of rigorous formal training and awareness about road safety is also warranted, as the findings suggest that a large number of commuters lack knowledge of road safety rules and regulations. The proposed models will not only help the present generation to be more careful about the road safety but also help to prepare the next generation for building a safe and accident free Pakistan.

## 1. INTRODUCTION

In every arena of human enterprise, rapid and ongoing transformations in terms of infrastructure and technology have become commonplace. With each passing day, advances in infrastructural development in transportation industry are also being witnessed. The number of vehicles on roads is increasing rapidly which makes the likelihood of road accidents transpiring greater. A World Health Organization Report (2018) states that the world experiences 1.35 million casualties each year due to road accidents. This is also considered to be the leading cause of deaths of children and young people aged between 5-29 years. Around 3500 people die each day due to road accidents, while 50 million face serious injuries annually due to road accidents (UNICEF 2008, Bliss and Breen 2009). The Federation of International Red Crescent Society defines threats to road safety as a global disaster that destroys lives and infrastructure, further hampering development and exposing millions of people to greater vulnerability. (Montella et al. 2008). Investigating the causes of death, Jacobs et al. (2000) note that amongst 100 identified causes of disability and deaths in 1990s, road accidents and crashes ranked at the ninth position with an upward revision to sixth position imminent by 2020 due to the rapid increase in the number of vehicles on the roads. According to WHO (2020), road injury remains the 7th leading cause of death in low-income countries.

Pakistan is amongst the countries with highest ratio of fatalities on roads globally. It not only loses precious lives due to the incidence of road crashes but also faces serious economic and infrastructural losses due to these crashes. It is estimated that almost 5,565 deaths occur each year due to road crashes and that the predicted number for such fatalities is on a constant rise. In their longitudinal study between 1956-1996, Batool, Carsten & Jopson (2011) found a fourteen-fold rise in the number of road accidents in Pakistan. The number of deaths due to road crashes rose to 27,582 people in 2016, further incurring financial losses equal to 4% of the GDP. This human and financial cost is calculated to be higher than the cost of losses in the war on terror or natural disasters (Zaman, 2019). The worsening situation of road safety in Pakistan is attributable to innumerable factors. Road hazards have increased manifold due to many reasons, ranging from unplanned urbanization, dearth of quality public transport and road congestion to lack of integrated national and urban transport planning. Additional causes include lack of awareness and formal training of road users, non-detering sanctions for law violators, outdated legislation and disorganized transport infrastructure.

The rise in motorization and excessive urbanization have combined to contribute to an unsustainable, unpredictable and ineffective transport system. The country has a total of 260,000 km networks of roads and 18 million registered vehicles which facts in concrete terms signify 42 vehicles per km. In cities, this figure rises to 250 vehicles per kilometer or even higher. Currently, the urban population in Pakistan is 37%, which is expected to rise by more than 50% by 2050. Population density in Pakistan is 251 per km<sup>2</sup>, whereas it increases to 25000 per km<sup>2</sup> in metropolitans. With greater density, the probability of roadblocks and accidents on the roadways becomes higher. If we compare the road networks of the Pakistani metropolitan cities, the length may be better, but the traffic is not well planned. With the exception of showcase projects like Metro Lahore, Metro Islamabad/ Rawalpindi, Multan and Peshawar and Orange Line Lahore, urban transport is overlooked. However, the impetus behind these projects is political in nature and has little to do with real urban planning. The major issues relating to urban transportation include inefficient traffic management, old and poorly maintained carbon-emitting vehicles, lack of

sustainable planning and high traffic density. Further, the lack of public transport results not only in great economic loss but also in high levels of pollution, protracted commutes and dangerous carbon emissions which imperil the overall health and wellbeing of the citizens.

The human factor is of critical importance in road safety. It is not only about how people use the roads as commuters and pedestrians but also about how they build and maintain the roads as well as create rules about safe usage practices. To understand knowledge, attitude and practices of the road users and of those involved in policy and legislation, there is need for in-depth study. Such human behavior centered research is useful for devising behavior modification techniques for road safety. One of the aims of the present research is to jumpstart an academic and policy debate on the issues related to road safety. However, proceeding from the assumption that existing outdated legislation has failed to deter violators of traffic rules, this research team chose to adopt an integrated applied research approach. It is interesting to note that not a single legal case of conviction due to a road accident is on record during the 72 years of Pakistan's existence. The lack of adequate and accurate information on Road Traffic Accidents (RTAs) is one of the key gaps in ensuring successful policy intervention for safe and disciplined roads. As discussed, the transport system is chaotic and unregulated. Unless remedial measures are adopted immediately, there is little to be optimistic about in terms of road safety and traffic jam, on-road air pollution and the wellbeing of commuters in Pakistan.

The standard operating procedures (SOPs) in road safety are either deficient or observed minimally. As key factors in ensuring road safety, these SOPs mediate intervention by law enforcement, fire and rescue, emergency medical services, transportation units, towing and recovery services. The role of these agencies is indispensable in terms of a timely response to saving lives and preventing roadblocks on national highways. Law enforcement agencies are tasked to perform important functions on the roadways, ranging from traffic control and incident investigation to crowd control after the incident to avoid further inconvenience. However, the emergency response mechanism in Pakistan is poor due to the absence of pertinent SOPs and prompt response. Whenever and wherever there is an accident, the traffic grinds to a halt not only due to the lack of a quick response by the emergency services but also due to jam-packed rightmost lanes on the highways. Commuters on roads seem to have no idea about how important it is to keep the right lane unoccupied for the emergency vehicles to reach the incident site promptly. This calls for the introduction of "move over" law (Chapter 89, Section 7(c) of General laws) that binds motorists to vacate the right lane immediately on hearing the siren of an approaching emergency vehicle. This law is implemented and successfully practiced in Massachusetts, USA. A key concern here is whether users in Pakistan are sufficiently trained to tackle the unforeseen incidents.

Deterrent laws enable masses to adhere to the rules of traffic, thus ensuring a well-functioning traffic mechanism. The penalties for violating the traffic rules are minimal in Pakistan. According to the National Highway Safety Ordinance (2000), the fine for exceeding the speed limit is PKR 200 and PKR 500 for motor bikes and motor cars respectively. In contrast, the fine for exceeding limit in the United Kingdom is £100 and \$45 in United States. Each violation costs 3 penalty points on the license, with automatic cancellation of the license when the penalty points reach the maximum number of 12. (Government of United Kingdom, Westchester County Government, 2017). Section 76(4) of National Highway Safety Ordinance (2000) levies the imposition of a fine of PKR 100-2000 for accidents resulting in death, injury, or property damage. Affluent persons tend to carry on violating laws since as such a paltry and minimal fine does not deter them sufficiently from re-offending. It is thus assumed that the persistence of minimal fines serves as one of the serious

contributing factors towards poor road safety in Pakistan.

The smooth and uninterrupted flow of traffic is imperative as it decreases the chances of catastrophic occurrences on the roads, thus improving road safety. To address this issue, the Government of Punjab took the first step of its kind in 2013 by expanding the Metro network that connected the Twin Cities i.e. Rawalpindi and Islamabad. The Metro project not only provided the masses with an affordable and safe traveling option but also reduced traffic density at the major intersection points connecting Islamabad and Rawalpindi. Nevertheless, due to its inherent limitations, the Metro project has not proved to be sufficient in doing away with the issue of density on roads. The Islamabad Expressway connects various important intersection points between Islamabad and Rawalpindi. This mega project was aimed at resolving traffic congestion by expanding the roads to five lanes from Zero-Point to Grand Trunk (GT) Road Rawat. However, the Capital Development Authority (CDA) had to halt the project due to inadequate allocation of funds by the government (Abbasi, 2017). Under the New Traffic Plan (NTP, 2017), it was envisioned that traffic congestion could be addressed by focusing on Islamabad Highway, Srinagar Highway, Islamabad Expressway, and Murree Road. The order for the NTP was given by the Ministry of Interior to the relevant officers. Thus, the NTP remains unimplemented. Analyzing the Pakistan Transportation Policy, Nazir, Nadeem & Véronneau (2016) found that the system lacks strategic, operational and tactical structure. Although the Government of Pakistan had come up with the National Action Plan for transportation, there was an observable lack of consistency and non-adherence to implementation standards in the proposed plans. The public continues to be confronted with frequent gridlocks and traffic issues. The peak hours exacerbate the situation, whereby excessive traffic congestion is observed between 7 to 9 AM in the morning (office opening) and between 5 to 8 PM (office closure) in the evening.

The problem is further aggravated as commuters tend to rely more on their private vehicles than on the public transport, thus leading to traffic density on the road. With vehicle ownership becoming easier due to car financing options and the proliferation of transport enterprises like Careem and Uber, people tend to opt for alternative transport system instead of public transport as it is more comfortable, convenient and easily available.

The current report, therefore, represents an endeavor to understand whether the commuters and drivers have adequate knowledge about traffic rules and regulations, and if so, to learn the extent to which they properly observe road safety while driving. Further, it looks at whether adequate SOPs are under implementation to address incidents related to traffic rule violations. The findings of the study are expected to contribute to the development of an effective mechanism for managing traffic density and reducing traffic accidents in the metropolitan cities of Pakistan.

## 1.1 Objectives

The current study was intended:

- a. to gain insights into the knowledge of commuters and drivers about traffic rules and regulations
- b. to gauge the extent to which drivers and passengers practice traffic rules if they have the requisite knowledge
- c. to highlight the lacunas in existing laws and identify whether there are adequate SOPs for dealing with traffic violations and accidents
- d. to propose an effective strategy/model and policy framework for better road safety in the urban areas of Pakistan.



## 2. REVIEW OF LITERATURE & ROAD SAFETY POLICIES

Moving from one place to another is a necessary aspect of human life. In ancient times, such journeys took place using traditional means. After 1769, with the advent of wheels and engines (Eckermann, 2001), people started travelling for even the least important reasons. As the movement increased, the ramifications became evident. With the passage of time, as the number of motor vehicles increased an increase in road accidents ensued. At a significant point in time, road safety emerged as the 8th leading cause of death globally (World Health Organization 2004). At the beginning, it was the drivers alone who were held responsible for the road accidents. For this reason, countries around the world focused on educating the commuters about road safety. Subjecting the commuters to the rigorous processes of license possession and enforcing severe penalties for errors (either minor or major) comprised common precautionary measures implemented by the authorities to ensure road safety.

The belief that road safety is the sole responsibility of road commuters tends to prevail in developing countries in particular. Therefore, a system is needed whereby it can be ensured that all road users possess accurate knowledge so as to reduce risks and increase safety on the roads. In addition to such knowledge, it is necessary for the system to ensure that there is commitment to practice. It is also convincing that such practice is reinforced by sound legislation and rigorous implementation. This calls for a certain level of enforcement, campaigns, education, advertisement and awareness among the public about the legislation (Tyagi et al. 2018). Recently, the focus of road safety has shifted towards a different approach for the first time. Commonly known as 'Safe Systems Approach', this approach calls for the structure of the roads to be human friendly and capable of accommodating human errors (WHO 2004).

The following review of existing literature is an attempt to identify the approaches followed by countries seeking to address the issue of road safety and possibly to reduce the number of deaths and injuries on roads. It also quantifies the human losses and the dynamics of road safety issues in the light of Safe Systems Approach (WHO 2004) and the conventional approach followed around the globe. The literature discussed in this section shows that the majority of high-income countries rely upon improving their road systems rather than assigning blame to human errors. In addition to the lack of a targeted approach for road safety systems in low-income countries which tend to center on human error as the most crucial component, there is also a dearth of a proper legislative structure for regulating human behavior.

### 2.1 Road Crashes

The violation of existing laws often results in road collisions. These offences include violations ranging from the flouting of traffic rules (especially in early or late hours of a working days), disregard of lane rules and driving on and overtaking from the wrong side to overloading of goods and passengers on transport (Mahembe et al. 2016). Other violations include poor maintenance of transport buses and overwhelming congestion caused by three wheelers, rickshaws and motorbikes, with such violations being prevalent in low income countries in particular (Mahembe et al. 2016).

The lack of appropriate and relevant knowledge is also one of the established factors underpinning road crashes as it is quite easy to get a driving license without passing or even attempting to pass a driving test in some countries. This is a clear example of the dearth of proper legislation and poor implementation of laws. One of the leading causes of road crashes in high

income countries is driving while inebriated or under the influence of drugs. Moreover, the use of cell phones is also one of the key challenges in maintaining road safety. Other than this, many social and environmental factors contribute to safe/ reckless driving (Mahembe et al. 2016). At times, the drivers' spiritual beliefs also affect how they drive on the road and what they think to be the cause of car crashes. These include beliefs that road crashes are fated and will happen even if the driver is completely in accord with the rules (Brown et al. 1988).

Taking into consideration the issue of gender, Martha et al. (2007) have argued that the gender of the drivers also determines views on road safety and risk-taking behavior on roads. Female drivers tend to exhibit low risk-taking behavior in comparison to male drivers. Another factor which increases the chance of death after a road crash is poor post-crash management. This can include a lack of first aid training, delay of emergency response, the interference of laypersons, inadequate pre-hospital treatment, and dearth of proper emergency equipment in trauma center, thus making the survival of an injured person more difficult (Zavareb et al. 2010).

## 2.2 Public Health and Road Crashes

Road crashes have many adverse effects on the mental, social and physical well-being of the people, thereby making road safety a major public health concern. Crashes are one of the major causes of serious brain injuries around the globe (WHO 2004), while in poor and developing countries, a huge percentage of trauma admissions (30- 86%) are the result of road accidents (Dalvi 2004). A Swedish report on psycho-social effects of accidents has reported that road crashes also lead to psychological complications, with fifty percent of the respondents experiencing travel anxiety even two years subsequent to the road calamity. In their study, Ghani et al (2003) found that almost 16% of the injured people were unable to their jobs, while most of the respondents revealed that they were no longer able to participate in economic activities due to the road accidents they had been involved in (Ghani et al. 2003). In a WHO annual report on road safety, it was found that individual anguish tended to be provoked by the way people's calamities were handled. It was further revealed that up to 3 years after the road traffic crash, a majority of the respondents experienced depression (64% ), while a number of them demonstrated suicidal tendencies (37%) without a perceptible decline thereafter. Similarly, 91% of the respondents revealed that they no longer took pleasure in life activities as prior to the accident, while between 70%-97% commented that they had not been adjudicated in a proper manner (World Health Organization 2004).

In developing countries, road accidents have a disproportionate impact on the poorest groups in their respective societies. For example, in Bangladesh, it was reported 21% of road accident victims were bread winners belonging to comparatively well-off families, while 32% of the victims belonged to the poor families. About three-quarters of households which had lost a family member in road accidents revealed that their life standard had been affected badly. Further, 61% of the respondents revealed that after the loss of their loved ones in road accidents, they had taken loans to make ends meet. The lower classes are found to be at greater risk due to their vulnerable situation (Ghaffar et al. 2004). Losing a family bread winner, particularly in developing countries, is disastrous as financial compensation given to victims' families tends to be inadequate (Douglas et al. 2011).

Beyond the human impact, these accidents have an overwhelming effect on the economy of the countries as they consume huge monetary resources (Jacobs et al. 2000). Each year, the world undergoes economic losses of \$518 billion due to road accidents (Peden et al. 2004). A study by the Transport Research Laboratory (TRL) revealed that the typical yearly expenditure due to

road accidents is 1% of GNP in lower-income countries, 1.5% in transitional economies, and 2% in countries with a higher ratio of motor vehicles (Jacobs et al. 2000).

### 2.3 The State of Road Safety in European Countries

According to Road Safety Performance Index (2018), Estonia is one of the safest countries in terms of road safety, witnessing a 32% reduction in the number of casualties on the roads between 2016 and 2017. While eight European Union (EU) Countries recorded forty deaths per one million in road traffic accidents, around eighty deaths per one million were recorded in 26 countries. Moreover, an overall decrease in road accident casualties was recorded in the EU countries. According to a report, a total of 25,300 people lost their lives on EU roads in the year 2017 which translated into a 2% percent decrease in the rate of road deaths from the previous year. Deaths in road crashes decreased by 20 percent between 2010-2017. Forty-nine deaths per one million were recorded as the lowest death rate in 2017. Amongst European Union countries, Sweden had the lowest death rate (25 deaths), UK (27 deaths), Netherland with (31), Denmark (32), Ireland (33), and Estonia (36 deaths) per one million. Poor road safety was recorded in Romania, Bulgaria and Croatia with 98, 96 and 80 deaths per million respectively (European Union European Transport Safety Council, 2018).

The Swedish Government raised the issue of road safety at national level to seek the attention of maximum commuters with a “vision zero” campaign, intended to mark zero deaths on Swedish roads. Reports indicated that by 2018, they were close to achieving the vision, recording only 41 annual deaths in road accidents. (Shoukriallah, 2015). A study focused on policy implementation in four leading European countries, found that UK, Denmark, Norway and Sweden had augmented their road safety infrastructure so that it would minimize the impact of human errors. The Road Safety Commission in Denmark has also focused on the driver’s behavior, laying emphasis on controlling alcohol consumption, overs speeding, junctions and cyclists (Shoukriallah, 2015).

In collaboration with the World Health Organization, Sethi, Racioppi and Mitis (2007) reported that around 32,000 road casualties in the age group of 15-25 transpire annually. In this report, 50 percent of the victims who were younger than 15 years were pedestrians, while victims in the 15 to 25 years age group were motorcyclists and car users. It was also found that the proportion of young deaths in road accidents was twice that of middle-aged people. The categorization of deaths by gender showed that 76 percent victims were male and 24 percent of the victims were females.

In 2007, some of the countries had not recorded and presented the data for progress in the previous year. Hungary, Poland, Ireland and Lithuania had fairly positive past records, but these had not been updated according to the need of studies. Luxembourg, France, Belgium and Portugal were trying to raise safety compliance. A fully Automated Speed Management System was introduced in France, and between 2003-2005 and 870 speed cameras became functional. The security system in Luxembourg, Belgium and Portugal was also strictly enforced, with police checks on over-speeding, drunk driving and seat belt use. Fixed penalties were updated in Belgium to make the system stricter in order to make the roads more secure. By controlling drunk-driving and over-speeding, Switzerland reduced its 20 percent fatality rate in 2005. Netherlands reduced the death rate by almost 20 percent, penalizing over-speeding, enforcing a drunk-driving penalty system and ensuring seat belt use (Achtenberg 2007).

In terms of road safety, the elements which affect and cause road incidents are quite different in countries with harsh weather conditions and socio-cultural contexts prone to drink-

driving. Jaroswski & McNamara. (2013) drew attention towards one of the major causes of road accidents being harsh weather, namely a rainy season, windy weather and snowfall as well as the chances of road accidents increasing three times when there is rainfall. The surface of roads also becomes oily and slippery which causes road accidents. In some areas, the weather radar technique is quite helpful for managing road safety in UK cities like Manchester with harsh climatic conditions. However, some countries considered this to be peripheral due to the limited applicability of this factor in all the areas. It is suggested that the speed of vehicles, number of vehicles and the responsibility of drivers are key factors in avoiding accidents in inclement weather.

There is a need to facilitate pedestrians and cyclists for planning an effective transportation system. Prioritizing road safety measures can be even more helpful in these areas which still need improvements in regulating speeding, drunk-driving, safety belt use, child restraint system, helmet usage and installation of speed cameras to record over-speeding (Achetrberg 2007).

Ireland was the fourth EU country with the largest reduction in road casualties between 2016 and 2017. As the figures show, Ireland was ranked fourth in terms of road safety amongst the EU countries in 2016. A total of 186 people lost their lives on Irish roads in 2016 with the number decreasing to 157 in 2017. There was an overall decline in road casualties for all commuters in Ireland, with the exception of cyclists. Deaths on Irish roads have decreased by 26% since 2010 (European Transport Safety Council, 2018). The European Union reports that every year almost 25,000 people die in road crashes and the average age of victims is between 15 to 25 years.

To meet set targets, the European Transport Safety Council had been trying to bring the risk level down to at least 50% by 2020. However, no significant change occurred in 2014, and 2016 was also recorded as a poor year in terms of road safety. It is estimated that 90% of road accident deaths occur in underdeveloped and developing countries. EU provided a five pillar plan for making the roads safer which includes Road Safety Management; Secure Roads and Mobility, Secure Vehicles; Safer Road Users; and Post-Crash Response (European Transport Safety Council, 2018). Germany aimed to reduce the number of death and injuries on roads to 40% by the year 2020 as compared to 2010.

Road safety screening is a newly developed system that integrates all important information in one main database. Under this system, automatic classifiers are used to collect the data about drivers who exceed the sign posted speed limit. It also provides speed data which shows information on road geometry as well as the condition of the road (e.g. rutting depth, cracks, skid resistance and unevenness). In this database, the most important information included is about the road accidents. Based on this data, the risk of accidents is described, and the value of safety calculated for the road sections.

Since 2014, road safety screening has used to identify the black spots and to implement appropriate measures to reduce the risk of accidents at these black spots. More than 600 employees on administrative level connected with road safety as well as the police have individual access to the information on this system (Kathmaun et al. 2016)

In European Union, Romania is one of few countries which lacks a National Road Safety Strategy. Romania is considered to be one of the worst performing countries in the European Union in terms of road safety management. Romania introduced the National Road Safety Strategy 2016-2020 based on 10 points. The strategy aimed at achieving institutional coordination, integration of human factor, designing of a road safety curriculum, training of drivers, investigation of road



accidents, psychological and medical examination of novice drivers, improvement in legislation, improvement in license examination system, better law enforcement, safer road infrastructure, safer passenger transport, technical support for vehicles inspection and research about road safety. This strategy not only raises awareness about road safety issues in Romania but also provides national insight for improving road safety performances targeted to reduce road accident deaths by 2020, thus bringing down the number from the statistics for 2010. This plan also provides different opportunities to communities and the private sector to work towards augmenting road safety (Burlacu et al. 2019).

### 2.4 Road Safety in United States of America

The road safety situation in United States of America (USA) is not as ideal as presumed. United States has struggled with keeping the number of casualties low while other developed countries have improved more in comparison with the former. In 2002, approximately 42,000 people died on the roads of United States (Evans, 2003). Traffic casualties between 1979 to 2000 decreased by 50% in Canada, 46% in Britain and 48% in Australia, but they decreased only by 18% in the USA. Unlike United States, all these better-performing countries viewed casualties or deaths and injuries as a public health problem. Owing to their limited population, Sweden and Australia have demonstrated more motivation towards road safety research than USA.

Nonetheless, United States has emerged as a world leader in road safety by virtue of the role it has played. There are two important factors which determine an individual's risk on the road. These include over speeding and not fastening seatbelts which are both individual choices and therefore under the control of the individual. Nevertheless, USA media has attributed the responsibility for more traffic casualties on tire manufacturers. However instead of encouraging drivers to use seat belts and follow the traffic rules, the US media tends to blame the tire manufacturing companies and flag design problems. These are factors over which drivers have no control, although on ground realities suggest that about 850 people have been killed in the US by drivers not making a stop at a red light.

To improve the road safety situation in United States, the Federal Highway Administration published and discussed a list of rules and policies for road safety improvement in 2010. In this regard, the American Road Transportation Builders Association (ARTBA) also focused on achieving a zero-fatality roadway infrastructure environment which is based on the idea that distractions, impairments, drowsiness and other factors lead to driving mistakes. The underpinning idea is that the road system should be anticipated in accordance with user error and planned, built and prepared accordingly. ARTBA discusses "severity", which means that the transport system should be designed to reduce the severity of the road crashes.

According to this, there is a need to prioritize human life and health beyond looking at the rate of traffic accidents and injuries. At the same time, transport users have the responsibility to follow the rules and regulations of traffic. US policymakers admit that they have a defective system and that they are trying to reduce the adverse consequences of the system. Therefore, the policy lays stress on reducing the severity of accidents and injuries in America. The policy anticipates users' mistakes and highlights designing, building and maintaining a system that will be "forgiving" of negligent behavior. ARTBA tries to ensure road safety through law-making, association, industry and consensus as well as partnering with other organizations and individuals to improve the transport network. It also emphasizes on collaborating with the public and the private sector organizations to improve road safety networks.

It invites academia to present and apply solutions for stopping road accidents, deaths and severe injuries. At the same time, considerable work has been done on identifying other factors contributing to road injuries in USA. MacKary (2004) found two main issues causing serious automobile injuries to include drink-driving and failure to use safety belts. In 2002, 10,000 deaths were recorded due to non-use of seatbelt. A 32,605 fatalities occurred in cars, trucks or vans that contained safety belts which were never used. Amongst total fatalities, only 34.1% of victims were restrained by seatbelts and child safety seats. This means that compliance with seatbelt rules can reduce the risk of death to a great extent. The use of safety belts was highest in 2003 being used by approximately 79% of the drivers. In the USA, only 18 states primarily adopted the enforcement of seat belts use. The second most common reason of fatalities in USA is drink driving. In 2002, approximately 35% casualties that occurred tested for high Blood Alcohol Concentration (BAC). Addressing this, 50 states and District of Columbia passed BAC as an indication of intoxication. Fifteen states adopted zero leniency for drivers under 21 and mandated that they may be stopped at clear-headedness checkpoints, with proven violations resulting in automatic license cancellation. Despite these initiatives and efforts, USA lags far behind other established countries in preventing road traffic injuries and fatalities.

## 2.5 Road Safety in Latin America

In Latin America, road crashes cause more casualties than homicides, yet road accidents do not receive the attention of the media and society. The World Health Organization declared road safety a matter of high priority by presenting a five- pillar plan to support the activities for the national road safety plan. (Bezerra et al. 2015). Road accidents in Latin America have serious impact on health system as they lead to overloading of the emergency centers. These road accidents cause postponement of many elective surgeries and operations as the medical staff becomes occupied with treating the injured persons. It is also a burden on economic system (especially on pension system) because the state has to pay pensions in the form of early retirement to the family of the deceased (Ferraz et al. 2012).

Road Safety has three components: vehicle (technology, age and condition), environment (signal, transportation system, health hazards, speed limit and traffic) and human factor (behavior, perception, road safety knowledge, training and monitoring). Road crashes occur due to these three basic components. For instance, 90% of the accidents are caused due to human error, while 30% errors are caused by the environment, and 10% of them occur due to a fault in the vehicle (Ferraz et al. 2012). Studies also demonstrate that action on the single component does not lead to a remarkable change in the conditions for road safety (Elvik et al. 2009).

Many Latin American countries have passed new laws and amended some of existing regulations to address the risk factors identified in 2008. Nevertheless, legislative measures have not proven sufficient for minimizing the number of crashes. These laws need to be more comprehensive, and enforcement of the laws needs to more rigorous with the help of properly equipped police. Latin American countries lag in achieving road safety. Except for a few cities, safe road experiences are not available to commuters. One of the major reasons preventing these countries from maintaining road safety is corruption. The corruption in the region is of great concern as it hampers the process of road safety, impedes the enforcement of laws as well as the achievement of standard vehicle status and infrastructure (Bezerra et al. 2015).

### 2.6 Road Safety in Australia

The history of road safety in Australia can be traced back to 1947 when the National Road Rules were established for the first time. It was further enhanced in 1958 when the first version of National Traffic Code was issued. In this document, a few codes were adopted, while others were ignored. Initially, the project for road safety was launched through Australian Road Rules; however, in 1995, the responsibility for the project was handed over to National Road Transport Commission (NRTC). Despite the adoption and implementation of the rules, road crashes and deaths proved unavoidable. The statistics for the year 1999 show that approximately 1700 road deaths occurred in Australia. This proved to be one of the major causes of premature deaths. If categorized, the ratio of road accident death victim ratio shows that the fatalities comprise 45% passengers 24% pedestrians, 15% motorcyclists, 14% cyclists with 15% comprising truck drivers among these fatalities. It was found that subsequent to the 1980s, the condition of roads improved and traffic casualties decreased by 48% in Australia (Shepherd and Calvert, 1999 and Evans, 2003).

### 2.7 Road Safety in African Countries

The issue of road safety is also of great concern in African regions. Although a plethora of laws exist, the road safety rules and regulations are negligibly implemented in these areas. Nonetheless, in an endeavor to improve the road safety in African countries, the UN general assembly passed a resolution (64/225) which provided the African region with a road safety plan of action for the years 2011-2012. Based on the data collected by 44 participating countries, a positive relationship between the issues of implementation and road crashes resulting in injuries, deaths, and economic damage was found.

The African regions have one of the highest road fatality rates worldwide. Nigeria and South Africa have the highest of casualty rates. African countries possess only 2% of the world automobiles yet make up 16% of the global road accident deaths. Furthermore, 62% of people killed in the African region are young adults aged between 15-44. Three out of four casualties occurring due to road accidents are males. On the risky roads of Africa, wheelchair ridden people, cyclists and pedestrians make up 53% of all reported deaths. There are only 2 countries in the South African region that have national strategies regarding the issue, and they encourage walking and cycling. On the other hand, four countries out of 11 states invest in public transport as an alternative to private transport.

The growth of population in the urban areas of Africa has resulted in road density which in turn creates an environment susceptible to road crashes and accidents. Only three out of 44 countries have safe speed limits. Nearly 14% of the countries allow 100 km/ hour speed limit while four countries allow 80 km/h. In African areas, only 14 countries have comprehensive laws for wearing helmets, and most of the countries have national laws for wearing helmets. All 44 countries revealed that they had national laws for using seat belts, although 73% of countries did not provide data on seatbelt use during the survey. With rapid increase in the use of mobile phone, 61% of the countries shared that they had national laws for restricting mobile phone usage. Only 12 out of 44 countries had emergency rooms to handle road crashes. These regions suffer from lack of surveillance, lack of health facilities and limited human resources. In the African region, five countries lacked an ambulance facility, while nine countries (22%) possessed a reasonably sized fleet of ambulances to transport victims safely to the hospital.

The abovementioned action plan recommended some measures for African regions which included promotion of public transport and ensuring safety of commuters on public transport. The need to improve the post-crash emergency response in terms of time and quality was also identified. The provision of a nationwide free telephone number for emergencies was also proposed. In the

plan of action, there was also a focus on improving the system of recording, storing of data about road accidents and gender-based categorization of casualties, injuries and disabilities in African regions. Data on age, type of road user, severity of the incidents and recovery results help in making new and better plans for measuring the effectiveness of the existing ones.

The UN has played a key role in improving road safety around the world. In the context of Africa, the UN (2015) suggested the “Status of Road Safety of the African Road Safety Action Plan 2011-2020”. The main objective of this study was to understand the current situation and the extent of implementation of the suggested action plan in the African countries. Only four out of 23 countries proved successful in completing the implementation of the pillar 1.

Nine countries are in the process of accomplishing the implementation of the first pillar of the plan of action, while the other nine countries have made some headway in the process. Nigeria, Zimbabwe and Ghana have fully succeeded in the implementation of the second pillar of the plan of action, whereas Malawi, Namibia and Mozambique have reported limited actions. Zambia, Sudan and Swaziland failed to provide data on the implementation of these activities. Concerning pillar 4, while some countries have partially implemented it, others like Congo, Botswana and Lesotho have taken insignificant action towards implementation.

Few of the countries have developed safety orders for commercial vehicle services. With reference to the implementation of the fifth pillar of the plan of action, the findings showed that most of the participating countries experienced challenges in provisioning emergency medical facilities, rescue equipment and medical supplies.

The study suggested that there was a need to allocate more resources on safety management, promotion of road safety research, and establishment of baseline data on road safety. The list of suggestions also focused on raising awareness amongst the people to support safer roads and movement. The vehicles need to be safer, with child safety measures being promoted amongst parents and awareness clubs being launched. The access to emergency services, ambulances, medicine and health units along the main highways was also proposed.

## 2.8 Road Safety in Asian Countries

Asian countries make up 59.76% of the total population of the world. In addition, the majority of countries in Asia are developing or under-developed countries with low income. These countries have to sustain great economic and infrastructural losses due to road crashes. This section discusses road safety as well as strategies, policies, and laws adopted in Asian countries.

Traffic accidents have caused more deaths and injuries than epidemics, affecting most of the population in developing countries over the decades (Ghee, 1997). The infrastructure as well as the transportation network has rapidly expanded in low-income countries. However, the accidents have not been prevented and nor has the severity of road accidents been mitigated (Almqvist & Hyden, 1994). In the developed countries, technological advancement, extensive research, culture of safety, and effective law enforcement systems have resulted in the reducing of casualties. In the countries that are already facing severe economic, health and social problems, the rate of accidents is higher (Chubukov et al. 2014). There are comprehensive studies which demonstrate the causes and consequences of traffic accidents in developed countries, but there is a lack of such research in developing countries. Approximately, 500 research studies were conducted in developed countries in comparison with 20 studies in less developed countries (Bhatti et al., 2008). A dramatic increase in the number of motor vehicles in Asian countries has resulted in an increasing number of road



crashes which suggests the need for a growing body of research in this area (Asian Development Bank, 2010). Moreover, it is worth noting that preventive measures vis-a-vis road accidents which are in practice in developed countries may not be equally relevant for developing countries (Asian Development Bank, 2010).

For instance, the findings of the research on the issue of road crashes in developed world may not be applicable in the context of developing countries. This is because of the differences in the attitudes, behaviors and knowledge of road users in addition to the differences in the traffic and road conditions in both regions. The socio-cultural context of less developed countries should be taken into account for developing relevant road safety solutions for such regions (Davis et al., 2003). The developed countries can provide key input on the standards of road safety in the form of tools for the research in less developed countries that can help them assess and evaluate safety measures (Almqvist & Hyden 1994).

Although Asia owns only 16% of the total vehicles globally, it accounts for 44% of the total casualties on roads. Furthermore, the developing countries have shown a 44% increase in the road crashes between 1987 to 1995. In 1999 alone, the Asia Pacific region accounted for half of the total deaths occurring on the roads. The phenomenon is far more serious and problematic than indicated by the statistics as majority of the injuries caused by road crashes go unreported in the developing countries (Jacobs et al., 2000). According to WHO (2018), low-income countries account for only 1% of the total vehicles, whereas 40% of the vehicles operate on the roads of high-income countries. However, low-income countries record 13% of the total road deaths around the world, while only 7% of these occur in high-income countries with a far greater percentage of vehicles. A longitudinal content analysis shows that the number of individuals killed in accidents on roads in less developed countries registered an increase between 1987 to 1995. In comparison, a steady decrease has been observed in the number of deaths caused by accidents on roads in developed countries (Jacobs et al., 2000). This trend is expected to continue in the future, as by 2020, it was envisioned that deaths caused by road accidents in low and middle-income countries would increase to approximately 80%, while decreasing by nearly 30% in developed countries (Peden et al., 2004).

### 2.8.1 China

China is the world's largest country in terms of population. It accounts for 18.47% of the total population of the world. Road networks in China cover over 1.87 million km (2004) of land area, of which covered area 48% is cemented. In 2003, about 99.6% of the towns and 91% villages had access to roads. The Chinese Minister of Transport and Communication announced plans to add up 300,000 km countryside roads and 50,000 km superhighways to extend the transport services in the country. By 2020, China planned to extend superhighways to cover 85,000 km which was envisioned at making China into the country with the largest expressway network.

According to the World Health Organization (2013), about 260,000 deaths occur each year. Of this number, 60% of the deaths are those of pedestrians, cyclists and motorcyclists. Road injuries are an ever-increasing phenomenon and a major cause of fatalities for the age group spanning 15 to 44. The growth of E-Bikes is an emerging issue due to which roads and sidewalks become overcrowded, thus causing many accidents and fatalities. In 2011 alone, there were 120 million registered E-bikes in China. This trend is ever-increasing in China due to E-bikes enabling cheap transportation and easy travelling highly dense traffic. The violation of speed limits is one of the key causal factors for road accidents. Exceeding the speed limit causes 14% of all crashes

that result in deaths due to over speeding. Pedestrians are 90% vulnerable to injuries if struck by a vehicle travelling at 45 km/h and they have 50% chances of survival. Drink driving also increases the chances of accidents. This risk increases if the level of alcohol is 0.04g/dl in blood. In 2011, China implemented new rules for drink driving which, if violated, led to the suspension of a driving license for five years.

## 2.8.2 India

India has the second highest population in the world. The total area covered by roads is 5,603,293 km of which 62.5% comprises cemented paths (Ranganathan, 2016). India reported 600,000 road accidents annually resulting in the death of 231,000 individuals. In India, there is an accident after every minute and a death after every 4 minutes with an increase of 1.5% in road accidents annually (World Health Organization, 2013). The number of people killed in road traffic accidents within India is four times greater than that of people killed in terrorism across the globe. The data shows that more than 1.25 lac people lost their lives in the year 2014, with almost 350 reported deaths transpiring per day. The major causes of these accidents were reported to be over speeding, Heavy Traffic Vehicles (HTV), over-loading, unlicensed teenage drivers, driving under the influence of alcohol, use of mobile phones while driving, lack of concentration and lack of sleep and rest. However, most of these causes are controllable, and they can be considered to occur due to the insensitivity of the drivers (Ranganathan, 2016).

The non-serious and careless behavior of the pedestrians makes them more vulnerable as they represent the largest ratio of deaths due to road accidents. Using mobile phones or listening to music while crossing the road is also considered to be one of the major reasons behind pedestrian deaths. In most cities, especially in busy ones, motorcyclists use the footpath to avoid traffic jams which is thus one of the leading causes of pedestrian accidents. The percentage of accidents is increasing drastically year by year according to Government reports (Ranganathan, 2016). The following table shows road accidents in correspondence with their causes.

**Table 2.8.2.1 Factors of Road Safety in India**

Parameter	Accidents	Killed	Injured
Fault of the Driver	486476	489400	0.6
Fault of Driver of Another Vehicle	137572	1399671	1.5
Permanent Disabled or Partial Disabled	494893	493474	0.3
Road Condition	8345	3456	7543
Weather Condition	5961	2554	5477
Poor Light	4210	1802	4394
Stray Dogs/Animals	1892	7741	2237
Civic Bodies	2188	9151	1867
Not Known	2946	1091	2759

(Source: Ranganathan, 2016)

The above table is a detailed representation of the major causes of road accidents, number of casualties and injuries in India. As the data reflects, most of the factors mentioned above are due to driver's fault including over-speeding, wrong over taking, signal jumping and drunk driving.

Ranganathan (2016) emphasized that the main cause of accidents on the roads in India is over speeding. It is considered as the primary factor for permanent disability and deaths after crashes. It has been estimated that approximately 40% of road traffic accidents are due to over speeding of vehicles. Over speeding has caused more than 50,000 deaths in the past several years. If a person is hit by a moving vehicle with a speed of 35 km/ hour, there are 10% chances of the victim's death and if the vehicle is moving at a speed of more than 40 km/ hour, then the chances go to nearly 90%.

### 2.8.3 Afghanistan

The road safety condition and policy implantation regarding this is quite alike as its neighboring countries. Most of the road networks in the country were built in 1960's. These entire road networks were destroyed in the wars of 1980's and 90's. Major roads were developed with the assistance of United States and Soviet Union, including the 12,350 km cemented and 29,800 km of non-cemented/ unpaved paths were urbanized. It has a road network of 42,150 km in 2006. About 731,607 vehicles were registered in Afghanistan in 2008. According to the state policy, import of vehicles older than 10 years is banned but this is commonly violated in country. On the other hand, vehicles are usually poorly maintained and driven by unqualified drivers. Most of the roads are in poor condition with the exception of Kabul where roads are in a comparatively better condition. According to World Health Organization report (2017), Afghanistan's road traffic accident death toll had reached 4,938 which make 2.11% of all fatalities. Age accustomed rate is 18.73 per 100,000 people. Afghanistan is placed 90th in terms of deaths by traffic accidents which could be ranked in world (WHO 2017).

### 2.8.4 Iran

With a population of 81,672,300, Iran has advanced cemented roadways connecting most of the urban and rural areas. According to WHO (2011) report, it had an infrastructure of 173,000 km roads, about 73% of these were cemented. A ratio of 100 cars over 1000 residents was reported in 2008. Death rate by road casualties had reached 22,143 (63%) of total deaths (2017). Iran ranks at 38th in world according to its death rate of 30.32 per 100,000 of its population. Awareness campaigns to educate public about road usage, road safety and traffic rules are being conducted by the government of Iran. Statistically, it is something to be considered as a significant note because deaths rate in Iran is twenty times more than the established global standard. Globally, road accidents kill about 1.2 million people and cripples about 20-50 million every year.

**Table 2.8.4.1 Factors of Road Safety in Iran**

Factor	Change Required	Decrease in Fatal Crashes and Improvements
Speeding	Reduction to 1km/h	4-5%
Seat Belts	Made Compulsory	40-60%
Child Restraints	Use of Infant and Booster Seats	71% (Infants) & 54%(Young Children)
Helmets	Compulsory Use	70% Reduction in Head Injuries
Road Designs and Infrastructure	Separating Different Types of Traffic, Foot Paths, Speed Bumps and Roundabout.	It will be Helpful in Reducing many Accidents.
Emergency	On Spot First Aid and Better Emergency Facilities	Increase the Chance of Survival and Avoiding Disabilities.

Source: WHO (2018)

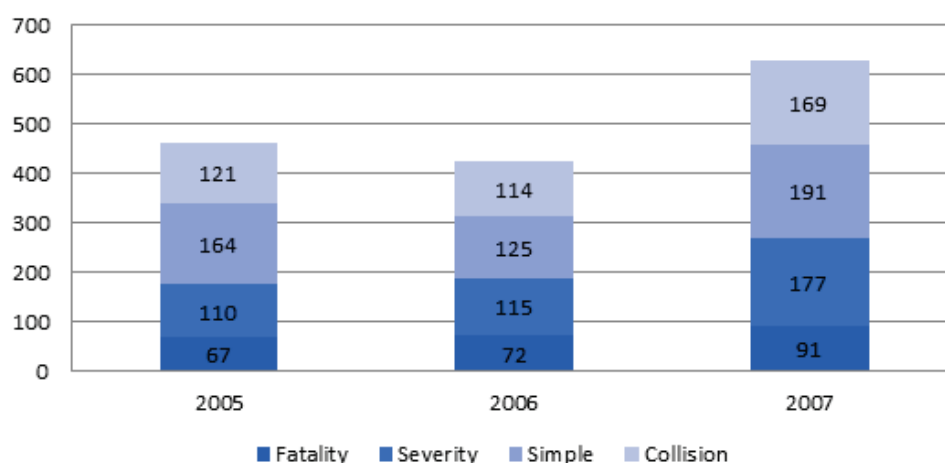
Around 28,000 people are killed and more than 300,000 are left crippled and disabled every year in Iran. In every second minute, a family in Iran comes across the news of an accident of its beloved who is destined to be disabled for the whole life. A person dies of road accident after every 19 minutes in Iran. It causes an economic loss of 5% of the total GNP/ \$6 billion loss. About 25% of accidents are due to motorcycles and 60% of them die just due to not wearing the helmets during driving.

Reducing speed limit to one km per hour will reduce road injuries to 4 to 5 percent in Iran. Making seat belts compulsory will reduce injuries by 40 to 60 percent. Use of infant and booster seats is important for keeping children safe as they cannot hold on to anything even in mildest jerks. Helmet compulsion will trim down head injuries and traumas to 70%. Similarly, improvement in road designs and emergency services are important factors for saving more lives in Iran.

## 2.8.5 Bangladesh

People's Republic of Bangladesh has a population estimate of 162,951,560. Transportation works as a backbone for the developing nations like Bangladesh. About 12% of Gross Domestic Product (GDP) and twenty percent of annual development budget is spent on transportation in Bangladesh. Transport industry provides bread and butter to about 9.4% of the total population of the country. According to the World Health Organization (2017), 20660 (2.62%) deaths were caused by road crashes. Bangladesh stands at 103rd number for its death rate by road accidents (15.56 per 100,000 people).

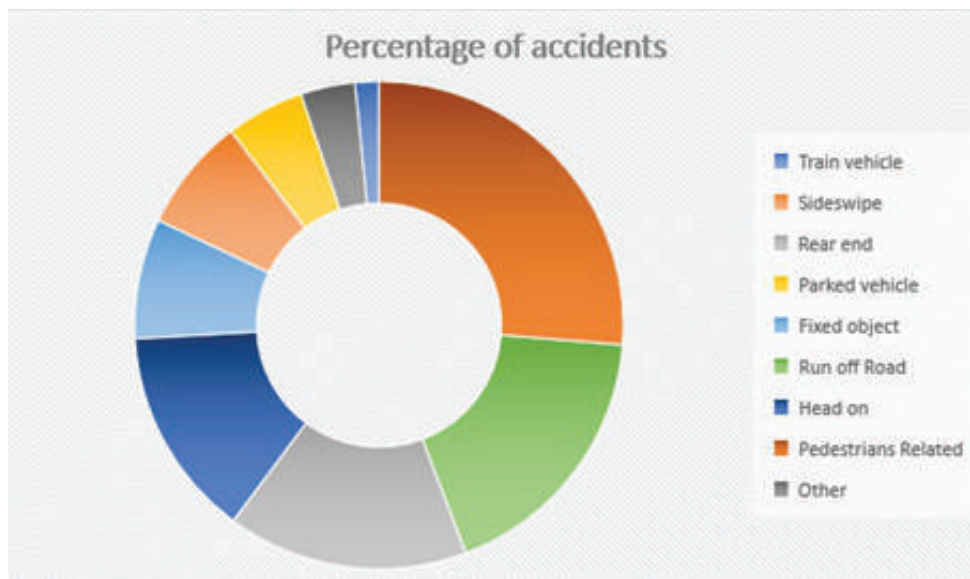
Banik et al. (2011) provide a survey study of road safety and accidents in Sylhet District of Bangladesh. According to their findings, the types of casualties in Sylhet District are shown in the Figure below.



**Figure 1. Types of Casualties and Collisions in Sylhet District of Bangladesh**



The reported types of accidents are 1.59 % of accidents occurred due to trains. Similarly, 7.57% accidents took place by sideswipe hitting of vehicles, 15.95% by rear end collisions, 5.18% due to wrong parking or by hitting parked vehicles, and 7.97% by hitting any fixed object like traffic boards, bill boards and trees. In the same fashion, 17.95% were hit and run accidents, 13.95%, pedestrians related accidents were the greatest in ratio of 26.29% and 3.60% of the accidents were reported to be due to other reasons and factors involved in the accidents (Banik et al. (2011).



(Source: Banik et al. 2011)

### 2.8.6 Pakistan

According to Pakistan Bureau of Statistics (2017), the population of Pakistan is estimated to be 210 million and is projected to reach 300 million by 2050 (UN, 2017). About 60 percent of the Pakistani population, which makes 118 million people lives in the rural areas where the main modes of transport are bicycle, motorcycle, qingqi, (rickshaw), on foot and tractor trolley for freight. However, consistent with global trends, the urban population in Pakistan is growing rapidly. Death rate from road traffic accidents in Pakistan is 4 per 100,000 population and 15 per 10,000 vehicles. The total number of registered vehicles has increased 17 times during 1956 to 1996 in Pakistan and road traffic accidents by 16 times (Hyder et al., 2000). According to WHO (2015), the total number of registered vehicles in Pakistan was 9 080 437 till 2011. However, Total registered vehicles 18352500, two-three wheels 13538200, 4 wheels cars/light 2835400 were reported in 2018 (WHO 2018). Among them, Heavy trucks 259900 and buses 229200 were registered. The number of deaths in Pakistani data is 4448, while WHO (2018) estimates 27582 that is manifold as compared to the national data. Urban speed is allowed 90, rural areas have 110 and motorways allows 130 km/h. Although the country has around 222 million population around 2 million vehicles and we have a huge road networks but footpaths are not constructed as over 90% population uses footpaths. Interestingly, helmet law is implemented but fasting is not required and standard is not required that makes gloomy picture with reference to protection of the drivers.

The condition of roads and technological implementations in the communication system is in the emerging stage in Pakistan. The ratio of deaths, as a result of accidents on roads, is increasing day by day. Pakistan has a total of 260,000 km network of roads representing 96% inland freight and 92% of traveler on the road (Zia et al. 2014).

Majority of the Pakistani drivers are male who run the economic affairs of daily household. For livelihood, they are supposed to move from one place to another on daily basis. These breadwinners lose their lives or at the least their potentials to earn as they had before due to road accidents and consequent injuries and fatalities (Nadeem et al., 2011). This does not only affects the economy of that family but also has a great impact on the economy at a broader level. According to World Health Organization, road traffic crashes lead to economic losses to victims' families, society and the nation. Pakistan loses 3 % of GNP due to road traffic crashes (Kazmi, 2014).

Gulzar et al. (2013) depicted an analysis of provincial road safety conditions which claims that Punjab had the highest number of accidents between the years 2000-2010 which count for 46,154 accidents, whereas Baluchistan posits on the least number of accidents with 3,958 accidents in the said duration. In Sindh 17,909 fatal and non-fatal accidents were reported and in Khyber Pakhtunkhwa, 24,131 accidents were recorded.

With an increase in number of vehicles on the roads, the number of accidents are also going above on the graph, especially in the metropolitan cities of Pakistan. Nadeem et al. (2011) highlighted some of the major causes of these accidents that include: over speeding, bad condition of roads, usage of mobile phones during driving, violation of traffic rules and regulation, encroachment on roadside, one-wheeling, and reckless driving.

Another research study held in Lahore, the second-largest city of Pakistan, highlighted that a total of about 332 people died and 27,264 people got injured because of incorrect turns and careless driving. A 47% of these accidents were caused by the motorcycles, 30% by cars, 19% due to rickshaws, 6% by commercial vehicles, 0.7% by trucks and 0.5% by buses (Batool et al., 2012). It is very clear from the above statistics that most of the accidents have been caused by the motorcycles. According to this study, most of the victims of these accidents are illiterate, uneducated and without driving sense on roads (Nadeem et al., 2011).

Accidents can occur due to several reasons, which may include carelessness of the driver, pedestrians and, in some cases, the fault of vehicle such as, failure of breaks, tire puncture and steering failure (Gulzar et al. 2013). Lack of awareness among people related to traffic codes, over speeding, driver's carelessness, violation of traffic rules and usage of old vehicles on busiest roads also call for road accidents (Kazmi, 2017). Zia (2014) found the fault of drivers to be more dangerous as compared to mechanical failure of vehicles by highlighting the fact that over speeding accounted for about 29.8% of the fatalities and reckless driving accounted for 17.7% of the fatalities.

The carelessness of drivers can be attributed to their attitude issues. Batool et al. (2012) found that the trained drivers drive more aggressively and are more careless than the untrained drivers. Social and cultural issues are also important causes of road accidents that lead to bad driving habits among drivers. Institutional issues are due to lack of valuation of road safety, poor organization and short-term strategies that were implemented for a limited time. Executive issues are lack of human resource management, such as the non-professional attitude of traffic wardens and lack of timely implementation by the government. They are not trained enough about how to implement certain rules and regulation on people.

Islamabad Excise and Taxation Department reported that growing road accidents in the country are due to enormous number of old and weak vehicles running on the roads. There is a total of 503,808 vehicles that were registered before and up to 1990. More than half of the total recorded automobiles are about thirty or more than thirty years old, hence causing road accidents (Kazmi, 2017).

It is to be noted that the inappropriate condition of the vehicle or the carelessness of the driver do not put the other vehicles and passengers at risk only, but also create problems for pedestrians as well. According to Zia et al. (2014), there are no such laws for pedestrians and cyclists due to which they suffer more severe injuries in road accidents. The ratio of pedestrians affected in fatal accidents was 59.7% which comprised of people aged 46-50. Young and old age pedestrians are mostly the victims of roadside fatalities and injuries.

According to World Health Organization (2013), traffic road accidents will be the fifth death cause in Pakistan by 2030. Approximately 3,400 people die every day on world's roads and 10 million people are injured and badly disabled. Around 30,310 people die every year in Pakistan due to road accidents. It means that 20 people out of 100,000 die in road accidents per year, making Pakistan 67th globally, for higher percentage of road accidents (Kazmi, 2017).

Urbanization and motorization have made the situation of road safety even more pathetic in Pakistan. The urban population is 32.5% and is predicted to be over 50% of the total population in a few years. The rapid growth of motorization is because of different schemes launched by banks without any strict criterion. There are no standardized driving practices on public transport system in Pakistan. As a result of which, people do not like to travel on public transport. They bring their own personal vehicles on roads and increase road density.

Another issue related to road safety is social injustice that is too high in Pakistan. If a person of higher status violates the traffic rules, he is treated as a Very Important Person (VIP) and receive gentle treatment. On the other hand, if lower- and middle-class people violate the traffic rules, they are treated strictly and face huge fines. Our outdated licensing system, crippled management, penalty system, encroachments on roads and less capacity of roadside users are vital factors in the scenario (Batool et al., 2012).

Bishai et al. (2003) found that almost 52% of drivers violate the traffic signals, while 15% of them are careless about "No Overtaking" lines. Self-enforcing measures of road safety like markings and road signs cannot be that much successful until they are combined with public awareness campaigns and enforcement of traffic rules for their effectiveness. However, for any policy or campaign regarding road safety, the socio-cultural context and factors related to individual psychology should be understood to change the behavior of drivers in a specific locality by the researchers and social planners. Therefore, it is necessary to conduct evaluative studies and researches which suffice the condition of each specific country and propose intervention strategies accordingly (Vlakveld, 2004).

In this regard, National Road Safety Strategy (NRS) 2018-2030 is based on a broad data-based strategy to improve the road safety for all road commuters with special attention to the vulnerable road user (VRU) group which includes motorcyclists, occupants of three-wheeled and non-motorized vehicles, pedestrians, cyclists, women, children, and older road users.

The NRS 2018-2030 envisions the road safety performance targets set by the United Nations. This covers road safety management, safe roads and roadsides, safe speeds, safe vehicles,

# ROAD SAFETY IN METROPOLITAN CITIES OF PAKISTAN

safe road users and post-crash response. Most importantly, the National Road Strategy (NRS) 2018-2030 includes an ambitious target to save more than 6,000 lives by 2030. National Road Strategy 2018-2030 for Pakistan has been developed using evidence-based approach. This has included the following activities:



Source: Pakistan National Road Safety Strategy 2018-2030

In accordance with international best practice, Pakistan National Road Safety Strategy 2018-2030 is based on the safe system approach which has been widely adopted across the world and is endorsed by the UN. Safe system principles require a shift in thinking from blaming crashes on the people using the road (usually drivers and pedestrians) to viewing the road, vehicle and driver as a 'system' which must anticipate and forgive human error. It is an inclusive approach that considers all people using the road system. In Pakistan, these groups include motorcycle riders, pedestrians, drivers and passengers in three-wheeled and non-motorized vehicles, car drivers and passengers and commercial vehicle drivers. Under the safe system approach, the tolerance of the human body to force is the guiding principle for the road transport system. The challenge for road



designers, operators and regulators is to manage the interaction between roads and roadsides, travel speeds, all vehicles and all road users. Consistent with the long-term aspiration for road safety, the safe system approach recognizes that people will always make mistakes and may have road crashes, but the system should be forgiving and when crashes occur should not result in death or serious injury.

According to WHO, the total number of registered vehicles in Pakistan was 9,080,437 till 2011 (WHO, 2015). Most of these vehicles are motorcycles. However, since 2008, motorcycle registrations have increased by 20 percent annually. Research in UK and USA shown that the relative risk of a motorcycle rider being killed or seriously injured per kilometer travelled was 54 times higher than for cars in 2006 in UK and 37 times higher than for cars in the USA in 2007.

Gulzar et al (2013) suggested the 3E's strategy to improve road safety in Pakistan. This includes education, enforcement and engineering of roads. These three fields must be altered with new policies and their proper implementation to make the roads safer for all commuters. Similarly, Batool et al. (2012) argued that the thoughtful interest from government along with improved interdepartmental coordination is immediately required to decrease the number and severity of road accidents. Severe need of transformation of drivers, develop tolerance among drivers through education is need of time. The authorities should avoid excessive delays and chaos. There is a need to make alteration in society at community level by nourishing people through media communication and NGOs' involvement in road safety campaigns.

Further, discussing the measures Nadeem et al. (2011) stated that the government of Pakistan should allocate some funds for driving centers. There is a severe need to start the campaign on road safety and to modify the behavior pattern of drivers towards road traffic. The use of electronic, social and print media should be encouraged for public awareness. Strong implementation of road traffic policies and law enforcement agencies is required in Pakistan. Licensing process in Pakistan is very impractical. Government needs to make it practical and comprehensive for people to become safe drivers. They suggested that the government of Pakistan should initiate some training programs and core courses before the provision of license. Traffic police should be deployed to keep a close check on drivers' behavior on the roads through random spot-checking and speed monitoring. Driving, under the age of 18 should be strictly prohibited. Parents must not permit them to drive until their legal age. During morning and evening peak hours, there should be alternate routes for traffic, separate from busier roads.

Moreover, manufacturing companies in Pakistan are not working well to provide safety in cheaper cars; basic features like Anti-locked Braking System (ABS) and Adaptive Driving Beams (ADB). Knowledge of the basic safety functions used in vehicles and understanding of how to use them effectively and timely is also needed for drivers in Pakistan (Kazmi, 2017).

Pakistani drivers need to be trained and knowledge gained during training must be tested properly before getting their license granted. There should be additional courses like Pass+ for novice drivers like they do in the UK. A comprehensive driving theory book needs to be developed which includes a complete code of conduct ensuring safety and ethics while driving and no license should be granted unless one passes an A-grade assessment on the same. The system of reporting should be improved by using special accident reporting form. The forms suggest recording road accidents by collecting information regarding automobiles, situations, the atmosphere, the causing factors, victims, cost of loss and trauma responses (Zia, 2014).

A safe system ensures that the forces in crashes do not exceed the limits of human tolerance. Speeds must be managed so that humans are not exposed to impact forces beyond their physical tolerance. System designers and operators must consider the limits of the human body in designing, maintaining and operating roads, vehicles and speeds.

**Table 2.8.6.1 Road Safety Comparison of Selected Asian Countries**

Countries	Road deaths 100,000 people annually	Road deaths /100,000 motor vehicles	Estimated by WHO report)	Year	Type of Driving
China	18.8	104.5	261,367	2013	Right hand
Afghanistan	15.5	722.4	4,734	2013	Right hand
India	16.6	130.1	238,562	2013	Left hand
Iran	32.1	92.7	24,896	2013	Right hand
UAE	10.9	38.2	1,021	2013	Right hand
Saudi Arabia	27.4	119.7	7,898	2013	Right hand
Bangladesh	13.6	1020.6	21,316	2013	Right hand

According to the World Health Organization report (2016), Iran has the largest number of fatalities in road accidents. However, Afghanistan has the fewest fatalities (over 15.5/100,000 inhabitants) due to the lack of a proper road network in conditions made difficult by terrorist activities and political instability. UAE has better-developed road networks, along with a lower 10.9/ 100,000 death rate.

There is very little understanding of the behavior of drivers in Pakistan who are mostly responsible for road traffic accidents. It is estimated that 91% of the road accidents are caused due to the errors of road users in Pakistan (Jacobs & Baguley, 1995). The lack of extensive research and in-depth understanding of factors which contribute to the violation of laws challenges the implementation and design of suitable intervention strategies for modifying the behavior of road users and drivers in Pakistan. As observed, the damage caused by road accidents can be reduced to a great extent by changing the behavior of drivers. However, as safety campaigns hitherto have been inadequate, there is a need for an in-depth understanding through of the phenomenon through research (Ahmed, 2007).

# 3. RESEARCH METHODS

## 3.1 Study Design

The present study comprised descriptive and action-oriented research which was carried out using a quantitative survey approach. The purpose of conducting surveys was to gauge the knowledge, attitudes and practices of drivers and commuters towards road usage and safety. The study was implemented in three phases, with each phase focusing on a different aspect of road safety.

In the first phase, we tried to identify loopholes in the existing laws and Standard Operating Procedures (SOPs) pertaining to road safety. We comprehensively reviewed the policy documents and archival documents of traffic regulations. A comparative analysis of these documents with international traffic laws was undertaken. In the second phase of the research, we estimated traffic density on the roads by utilizing two different strategies. Firstly, we gathered data from the traffic police and other concerned departments controlling the camera systems to monitor the flow of traffic at specific times and locations. Secondly, in locations without CCTV cameras teams of enumerators were formed and deployed to numerate the vehicles traveling over different highways and roads. In the third phase of the research, a quantitative survey was conducted for exploring the knowledge, attitudes and practices of the road users about road safety.

The study was conducted in five metropolitan cities, namely Islamabad, Lahore, Peshawar, Karachi and Quetta of Pakistan. The studies were conducted in these cities because they are connected with most parts of the country through a network of highways and motorways. These cities also tend to have the highest density of traffic in the country. Owing to these characteristics and the size of the population, our research results represent the views of a major percentage of the population, thus making the findings generalizable to other populations. Since the aim of the study was to propose a prototype model for the regulation of traffic density, it was also necessary to design it according to the metropolitan cities of the country.

The sampling strategy applied in the study was multi-staged cluster sampling. Utilizing this strategy, we first formed clusters of five metropolitan cities (Islamabad, Lahore, Karachi, Peshawar and Quetta) based on their population size and the representativeness of their respective provinces. At the second stage of the sampling, we used purposive sampling strategy to access the drivers and commuters for collecting purposeful data from them. At the third stage, we used the proportionate sampling technique to draw samples from each cluster. Each of the cluster contained disproportionate number of road users with asymmetrical division of road users based on the types of vehicle which they used. Existing statistics of the National Transport Report Center (NTRC) and WHO Report (2018) were also used in the study. In addition, we also compared the reported road accidents in the three leading newspapers of the country (Dawn, Jang and Express) to check the external validity and reliability of the present research study.

**Table 3.1 Population Distribution Across Study areas**

S/NO.	Cities	Total Population <sup>1</sup>
1	Islamabad	1,014,825
2	Karachi	14,910,352
3	Lahore	11,126,285
4	Peshawar	1,970,042
5	Quetta	1,001,205

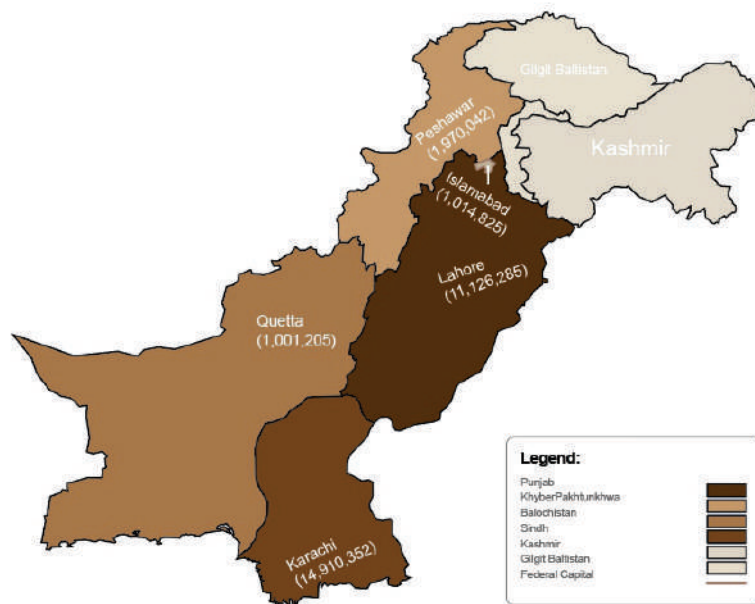


Figure 3.1 Population distribution across cities under study

The sample size ( $n$ ) was determined by the proportion of units in each stratum ( $H$ ) by using the following formula:

$$\sum_{b=1}^H n_b = n.$$

Where  $H$  was each stratum of total population ( $N$ ), and  $n$  was the sample size for the stratum. In first phase, the data were collected from 6000 respondents. In the second phase, the data were systematically edited, with a number of questionnaires being discarded as they were partially filled or had missing information. After data editing, 2946 questionnaires comprised the dataset which was subsequently analyzed. The following table explains the sample distribution in metropolitan cities:

Table 3.2 Sample distribution across study areas

City	Frequency	Percent
Islamabad	357	12.1
Karachi	759	25.8
Lahore	796	27.0
Peshawar	624	21.2
Quetta	410	13.9
<b>Total</b>	<b>2946</b>	<b>100.0</b>

<sup>1</sup> Pakistan Bureau of Statistics



The tool for data collection was a structured questionnaire. The nature of the research design required closed-ended responses in order to analyze the knowledge and practice of drivers and commuters with regard to road safety. It was assumed that there is a degree of variation in the knowledge, attitudes and practices (KAP) of drivers towards road safety. The questionnaire was thus divided into three sections to seek respondents' responses against various indicators of KAP.

For the sake of convenience and efficient time management, two different tools were designed to record the responses of two distinct groups, namely drivers and non-drivers. Afterwards, both groups were merged in a single questionnaire to make it feasible for the respondents to respond to the questions. The questionnaire was produced in Urdu and English to make it accessible to the respondents with proficiency in either of the languages. Before conducting the formal data collection, we piloted the questionnaire to ensure that the questions were clear and understandable, and that the respondents comprehended its meaning or interpretation as intended. Certain changes were made by subsequent to the initial pilot testing to improve comprehensibility. The amount of time entailed in responding to the questionnaire and the level of difficulty of the questionnaire were also evaluated.

A team of researchers and enumerators were appointed for the collection of data because of the broad scope and scale of the study. The enumerators were trained by their prescribed team leaders (Research Assistants) who were also responsible for maintaining the quality of work in the field. The enumerators were students enrolled in sociology departments at different universities collaborating on the project. Thus, they were equipped to handle the influx of data and conduct the research professionally. Data were collected through face-to-face interaction with the respondents. Questionnaires were distributed among the respondents, and in case of any confusion or problem while filling the questionnaires, the researchers were present to offer assistance. The researchers used language that was intelligible to the respondents and collected data from the respondents at a time and place convenient to them.

The data was analyzed through IBM Statistics, commonly known as Statistical Package for Social Sciences (SPSS) which allows for systematic analysis. It was easy to apply and not time-intensive (Bryman, 2008). The findings were analyzed in with reference to the existing literature and theory. The similarity and differences with existing literature were highlighted in the findings of the research. The graphs and tables generated through SPSS were further elaborated and explained in MS word. The same procedure of comparing data with existing literature and theory was followed.

### 3.2 Fieldwork Experiences

The research team identified multiple constraints during field work while collecting the data. The people (respondents) were reluctant to respond to the questions related to their attitude and practice towards traffic rules. When the research team approached different institutions and organizations for collecting data from respondents with diverse backgrounds, the respondents showed reluctance in participating because they perceived it as an NGO based survey that would harm the reputation of the country. Although many of the respondents were literate enough to fill the questionnaire on their own, they still tended to show reluctance in responding to the survey. The researchers had to seek and record answers through interviews. In many areas, the respondents were cooperative and took great interest in filling the questionnaires and learning about the purpose of this research. The respondents were expected to see the implementation of better strategies for road security in the imminent future.

### 3.3 Ethical Considerations

As this research was based in metropolitan cities of Pakistan, it was quite challenging to gain the trust of respondents and to ensure full confidentiality to them. To maintain the anonymity of the respondents, the names of the respondents were not sought. The researchers secured informed consent from the respondents before handing out the questionnaires. The research teams also followed the dress preferences of each city and abided by the local norms and values. The researchers followed strict guidelines to maintain the academic integrity and transparency of all research procedures, encompassing design, implementation and publication.

## 4. RESULTS

### 4.1 Knowledge about Road Safety

Statements	Categories	F	%
Speed limit in a residential area	100km/h	48	1.7
	80km/h	121	4.3
	70km/h	196	6.9
	50km/h	1998	70.6
	Don't Know	466	16.5
Speed limit near mosque/ school	100km/h	136	4.8
	80km/h	42	1.5
	70km/h	53	1.9
	50km/h	2221	77.9
	Don't Know	398	14.0
Knowledge about child seat	Any seat	182	6.4
	In lap of an adult	964	33.8
	Front Seat	203	7.1
	Child Seat	1260	44.2
	Don't Know	243	8.5
Overtaking from left	Vehicle ahead is driving slowly	1121	40.0
	When you want to turn left	1250	44.6
	Don't Know	434	15.5

Sufficient knowledge about road safety and the repercussions of violating road safety measures may enable potential road crash victims to avoid such life-threatening and risky driving behavior. Table 4.1 highlights the knowledge of road users (including drivers, passengers and pedestrians) about road safety and their responses in specific situations while on the road. We questioned road users about common road safety rules and regulations to check whether or not they had adequate understating of road safety. The questions pertained to their knowledge about the speed limit in residential areas, mosques and educational institutions, in addition to their awareness of appropriate seating for a child passenger and the rules for overtaking. We found that most of the road users had appropriate knowledge regarding speed limit near residential areas, mosques and schools. However they lacked knowledge about child seats and overtaking from the left side. As the table above shows, while the respondents demonstrated a certain degree of knowledge about road safety measures, they did not fully realize the importance of it. The lack of knowledge about child seat is linked to cultural aspects in Pakistani society. The table above shows that 33.8% of the population believed that children could safely travel in the lap of an adult. This indicates a non-serious attitude towards children's safety. Further, it shows that this behavior is so normalized amongst the people that they do not even consider it as a violation of law. Therefore, we need to address this issue to counter the negative consequences of road crashes and to ensure road safety for everyone in society.

## 4.2 Drivers' Attitude towards Road Safety

Statements	Categories	F	%
In hurry to turn left at signal	will take the available lane with less vehicles	1112	38.6
	I will wait for the green light in the left lane	1771	61.4
Shifting to right most lane at U-Turn	When it comes near	547	19.1
	Whenever it is convenient	828	29.0
	When I reach at the divider	590	20.6
	When I see the sign board	895	31.3
Violating One-Way at U-Turn	Take the nearest U-turn and drive against one way	752	26.2
	I will drive to the next U-turn	2119	73.8
Overtaking from right	I will overtake from the left side	803	28.2
	I will use the horn/dipper & wait for the vehicle	2048	71.8
Using Mobile while driving	Use mobile speakers to listen to the call	775	27.4
	Pick the call and handle the vehicle with one hand	700	24.7
	Park the car and respond to the call	1358	47.9
Smoking while driving	I will smoke while driving	482	16.8
	I don't smoke	1999	69.6
	I will stop the car and then smoke	390	13.6
Violating One-Way at U-Turn	I will reverse back to the last U-Turn	892	31.1
	I will drive to the next U-Turn	1977	68.9

Attitude is a significant indicator of individual practice of a particular behavior. A positive attitude towards road safety may result in reducing the ratio of road crashes, while a negative attitude can result in risky driving behavior and higher ratio of road crashes. Table 4.2 shows the attitude of drivers towards road safety with regard to taking a U-turn, smoking, overtaking and mobile phone usage while driving. The picture here is not clear cut, as many of the responses may reflect a tendency to provide socially desirable answers rather than the driver's actual attitude. Nevertheless, it is evident from the table above that the majority of the drivers claim to take safety measures while driving which is a good indicator of road safety. However, the development of human behavior is important for better profiling road safety measures. This can be done by conducting proper training for the drivers and levying heavy fines for violations. The findings

suggest that the majority of the drivers have a negative attitude towards road safety. They consider overtaking other vehicles and taking U-turns from the wrong side in times of urgency as normal responses. A significant percentage of the drivers use mobile phones and/or smoke while driving. An increase in negative attitudes like these could be related to the higher ratio of road crashes and fatalities in Pakistan.

### 4.3 Commuters' Attitude towards Road Safety

Statements	Response	F	%
If you are travelling in a vehicle and your driver is using mobile phone, would you ask him/her to stop using it?	Yes	2349	82.2
	No	509	17.8
If you are travelling in taxi or public transport and driver is not driving safely, would you intervene?	Yes	2459	86.4
	No	388	13.6
If you are travelling in taxi or public transport and driver is smoking, will you stop him?	Yes	1881	66.1
	No	963	33.9
If your driver is talking with fellow passengers that are diverting his attention would you intervene?	Yes	2173	76.7
	No	659	23.3
In case a driver is driving dangerously, what would you do?	Will ask him to drive safely	1718	61.1
	Call the police for help	130	4.6
	Will call his company to report his behavior	535	19.0
	Will let him do that in case I am getting late	427	15.2

As mentioned earlier, the attitude towards a certain phenomenon is an indication of what practices are adopted in response to it. For instance, while a positive attitude leads to engagement in certain activity, a negative attitude leads to the prevention or negation of certain acts. This statement very much rings true in the case of road safety and people's attitude towards it. The risk-taking behavior of drivers is not the sole reason for road crashes. Rather, the passengers accompanying the driver in the vehicle also play a crucial role in this regard. Passengers with negative attitudes towards road safety are likely to provoke driver into driving dangerously. On the other hand, the positive attitude of passengers towards road safety is likely to reduce risk taking amongst the drivers on the road. Table 4.3 shows an overall positive attitude on the part of passengers towards road safety with regard to driver's risk-taking behavior (e.g. using mobile phone, unsafe driving and smoking while driving). Many of the road accidents are caused due to the distractions listed above, and it is essential to sensitize the passengers as well as the drivers towards taking into consideration these important factors of road safety. However, a significant number (33%) of the passengers reported that they did not attempt to intervene if their driver smoked while driving. This evidences passengers' lack of knowledge with regard to road safety. They do not seek to check the drivers

or to intervene even if they are resort to distractions like using mobile phones and smoking while driving. Hence, there is clear need to inform and to educate the public regarding traffic rules and regulation and to enable them to practice it at individual level.

## 4.4 Perceived Causes of Road Accidents

Causes of Accidents	Frequency	Percent
Overloading of passengers in public transport	1029	7.99%
Bad weather conditions	863	6.70%
Wrong parking at the roadside	880	6.83%
Roadside encroachments	734	5.70%
Congested roads	851	6.60%
Driving in wrong lane	1432	11.11%
Absence of traffic signals	870	6.75%
Using mobile phones while driving	1146	8.89%
Dangerous driving	1457	11.31%
Not maintaining the vehicle	766	5.94%
Careless behavior of motor bikers	1130	8.77%
Over speeding	1727	13.40%

Individuals develop their perceptions about a phenomenon on the basis of personal observations and experiences. In research, evaluating perceptions enables researchers to make predictions in regard to actual behavior. The study participants were questioned about the major causes of road accidents. Table 4.4 illustrates the perceptions of commuters regarding the major causes of road accidents. According to our data, the three major causes of road accidents in ascending order are over speeding, dangerous driving and driving in the wrong lane. While 13.40% of the respondents stated that driving in the wrong lane caused road collisions, 11.31% of them viewed dangerous driving as the major cause of road accidents. On the other hand, 11.11% of the respondents believed that over speeding was a major cause of road crashes. Although many factors lead to a high number of crash fatalities, the data shows that the most frequent cause of accidents is over-speeding. This merits careful attention from the government sector as well as from the road users. Generally, over speeding is the key factor for road accidents around the globe. For instance, the World Health Organization report (2013) states that if one is struck by a vehicle travelling at 45 km/h the chance of survival is respectively estimated to be 90% and 50%, whereas there is virtually no chance of survival if one is hit by an automobile traveling at a speed of 80 km/h.

## 4.5 Drivers' Road Safety Practices

The road use practices of drivers are important indicators of safety on roads. Unsafe driving, violation of road safety laws and avoidance of safety mechanisms may cause a higher number of road crashes. Similarly, abiding by road safety laws and practicing road safety mechanisms such as the use of seat belt and helmet is likely to significantly reduce the ratio of road accidents. Table 4.5 showcases drivers' practices in relation to the use of seat belt, use of indicators, side mirrors and making U-turns. The responses in this regard were not conclusive. For instance, to varying degrees, the respondents stated that they used seat belts (41%), deployed indicators while taking U-turn (73%), followed signals (56%) and used side mirrors while driving (65%). However, a substantial number of the participants (25%) stated that they tried to drive faster to cross the



Statements	Always		Often		Sometimes		Rarely		Never	
	F	%	F	%	F	%	F	%	F	%
Do you fasten a seat belt while driving?	1086	41.5	471	18.0	456	17.4	143	5.5	464	17.7
Do you use indicators while taking a turn?	2097	73.0	465	16.2	208	7.2	49	1.7	54	1.9
If you are in hurry, do you still follow the signals?	1610	56.7	536	18.9	433	15.2	106	3.7	157	5.5
Do you drive faster and try to cross the signal before it gets red?	711	25.0	247	8.7	613	21.6	552	19.4	719	25.3
Do you use side mirrors while driving?	1859	65.6	422	14.9	222	7.8	107	3.8	224	7.9
Sometimes U-turns are at a distance and there are cuts in the road, if you are in hurry, do you use these spaces to make U-turn?	675	23.6	291	10.2	792	27.6	484	16.4	623	21.7

signal before it turned red, while many of the respondents (18%) stated that they rarely wore seatbelts. It is apparent that some behavioral adaptations are needed by drivers to help them to improve their ability to maintain speed limits and wear seat belts while driving. It would be best to build an understanding of the impact that over-speeding and not wearing seat belt can yield on their safety. In this regard, different awareness programs should be arranged for all the road users which incorporate the emotional factor through documentaries to sensitize them towards the dire consequences of violating traffic rules.

#### 4.6 Pedestrians' Practices of Road Usage

Statements	Categories	F	%
Pedestrian behavior in case thereof no footpath	Will walk in the same direction of vehicles	556	19.7
	Whatever is convenient for me	1382	48.9
	Will walk in the opposite direction of vehicles	888	31.4
Riding on/ off the bus	When it is near to me	467	16.4
	I would not bother for bus to stop in case of rush	406	14.3
	When it is fully stopped	1970	69.3
Crossing the road	I will run and cross	401	14.2
	I will keep moving and make a stop signal with hand	1108	39.2
	I will find the overhead bridge to cross the road	1321	46.7
Safest way for pedestrian	From wherever it is convenient	602	21.5
	Will use either overhead bridge or zebra crossing	2195	78.5

Pedestrians are not passive victims of road crashes. Rather, their road use practices have serious consequences for road safety, ultimately influencing the overall road safety situation. Pedestrian use roads for different purposes crossing the road and using the road in case there is no footpath. Risky road crossing by pedestrians and their avoidance of zebra crossings as well as riding off and into the vehicles on the road have serious consequences for pedestrians and drivers alike. Our data shows that a significant number of the participants (48%) reported that they would use any part of the road convenient to them in case there was no footpath on the road. While nearly 15% of the respondents stated that they would run to catch a bus rather than waiting for it to stop, a similar percentage revealed that they would run and cross the road even if there were vehicles. These statements indicate a risky attitude towards road safety amongst the pedestrians in Pakistan. If this behavior is not modified through proper intervention, it is likely to exacerbate the road safety situation in Pakistan further.

Traffic rules are important for the safety of road users. Awareness about road safety laws can safeguard drivers and pedestrians alike. When these laws are not followed or ignored by road users, the cost is injury or even death. If we are aware of road safety laws, rules, and regulations, we can save not only our own lives but also the lives of other thousands of road users. Seminars and training sessions are the important tools for developing awareness about road safety.

## 4.7 Road Safety Training and Awareness

It is evident from Table 4.8 that only a small percentage of respondents learnt to drive by enrolling at police coaching centers, while other respondents learnt to drive on their own or with the help of relatives. As such respondents are likely to be unaware of traffic laws, regular seminars/workshops can help them gain knowledge about road safety laws. When asked if they had attended any seminar on road safety, the majority of the respondents (80.1%) reported that they had never attended any session or awareness programs on road safety. This may be one of the major reasons underlying the worsening road safety situation in Pakistan. In sum, the dearth of trainings and sessions leads to lack of awareness about road safety, thus resulting in road accidents and fatalities. As the data analysis shows, only 20% of the respondents had attended training sessions or seminars about road safety.

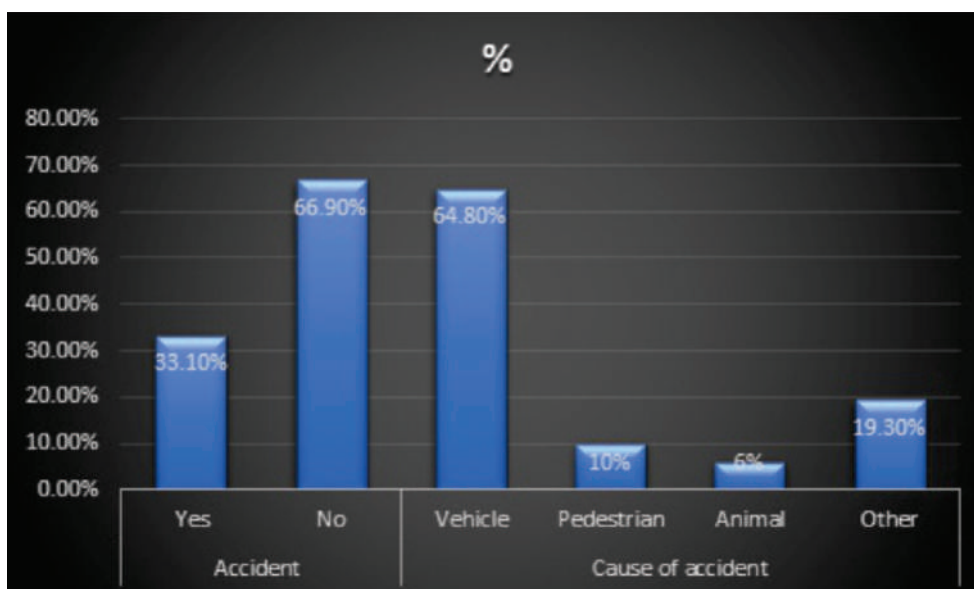
## 4.8. Driving License Mechanisms

Statements	Categories	F	%
Driving License	Have	1345	46.2
	Don't have	1220	41.9
	In-process	272	9.3
	Learner	74	2.5
Learning Source	Driving School	226	7.9
	Friends/Family Member	1665	58.5
	Traffic Police Coaching	51	1.8
	Self-learning	904	31.8

Driving licenses are issued to every trained driver, and the possession of driver license implies that the license holder is aware of traffic laws. Globally, it is mandatory to obtain a driving license before one can drive. The lack of driving licenses shows that the drivers are unaware of multiple aspects of road safety. To secure a driving license, the applicants must pass both written and practical test. Along with the driving license mechanism, the person or institution delivering

knowledge of driving to the driver is also very important. Driving licenses play a key role in road safety, and the awareness of traffic laws is a concomitant of safe driving. The table above illustrates the driving mechanism and the learning source used by the respondents. The study found that more than half of the drivers had not obtained driving licenses and yet drove regularly. The study also revealed that only a negligible percentage of respondents (1.8%) had taken lessons from traffic police coaches, thus highlighting that people do not consider road safety an issue. Rather, the majority of the drivers revealed that they were self-taught or had learnt to drive with the help of their friends or/family members, thus creating unawareness about traffic laws and greater likelihood of road crashes. The inclusion of strict rules regarding driving licenses is needed.

### 4.9. Accident History



Human error is considered to be the most important reason for road crashes. Various human actions (e.g. over-speeding, mobile phone usage while driving, irregular U-turns, unawareness of traffic laws, frequently changing road lanes, and overloading) are usually key reasons for road crashes. The above graph illustrates the facts and figures of road crashes and reasons underpinning road crashes. When respondents who had been involved in road accidents were asked the reason for the crash, one-third of the respondents reported that the accidents were caused by pedestrians and animals. Ten percent of the accidents had been caused by pedestrians, while 6% were caused by animals. Similarly, almost 20% drivers reported the cause of accident as being a technical fault in the vehicle. This shows careless driving on the part of many of the drivers or the lack of rules and regulations issued by the concerned authorities for controlling the attitude of drivers about road safety.

## 4.10. Fastening the Seat Belt by Age

Age vs Seat belt						
Age	Do you fasten a seat belt while driving?					Total
	Always	Often	Sometimes	Rarely	Never	
Below 18 years	27	15	13	0	25	80
	33.8%	18.8%	16.3%	0.0%	31.3%	100.0%
18-20 years	187	98	92	43	121	541
	34.6%	18.1%	17.0%	7.9%	22.4%	100.0%
21-30 years	527	271	273	81	231	1383
	38.1%	19.6%	19.7%	5.9%	16.7%	100.0%
31-40 years	226	64	51	13	46	400
	56.5%	16.0%	12.8%	3.3%	11.5%	100.0%
41-50 years	74	11	20	4	24	133
	55.6%	8.3%	15.0%	3.0%	18.0%	100.0%
More than 50 years	33	7	4	1	9	54
	61.1%	13.0%	7.4%	1.9%	16.7%	100.0%
Total	1074	466	453	142	456	2591
	41.5%	18.0%	17.5%	5.5%	17.6%	100.0%

The non-use of seat belts is one of the major reasons for road crashes around the globe. Strict use of seat belts while driving can significantly reduce the ratio of crashes on the roads. The use of seatbelts tends to vary across different age groups, with evidence showing that road crashes are the leading cause of death amongst the younger population. For this purpose, we questioned our study respondents about their seat belt usage on the road. The table above shows the cross-tabulated relationship between the age of the vehicle drivers and their use of seat belt while driving. It was found that the percentage of people making use of seatbelts increased with an increase in age. We found a positive relationship between these two variables. These cross-tabulation results show that older people are more careful in this regard. This is evident from the above table wherein the respondents aged 31 and above are more likely to fasten their seat belt while driving. This may be due to their experiences and exposure to traffic accidents, thus resulting in their decision to make use of seatbelts while driving. These findings are significant for policy makers and other stakeholders who may choose to focus on spreading awareness among the younger population of our country with regard to the importance of using seatbelts while driving on the roads. The stakeholders should also devise age-specific policy measures with a focus on the younger population to reduce the ratio of road accidents and to implement mandatory seatbelt use by every age group.

#### 4.11. Knowledge of Speed Limit in Residential Areas by drivers' Age

Age vs Speed in residential area			
Age	Speed in residential area		Total
	50 Km/hr and less	More than 50 Km/hr	
Below 18 years	66	17	83
	79.5%	20.5%	100.0%
18-20 years	410	112	522
	78.5%	21.5%	100.0%
21-30 years	1131	194	1325
	85.4%	14.6%	100.0%
31-40 years	386	49	435
	88.7%	11.3%	100.0%
41-50 years	129	13	142
	90.8%	9.2%	100.0%
More than 50 years	47	6	53
	88.7%	11.3%	100.0%
Total	2169	391	2560
	84.7%	15.3%	100.0%

The proper knowledge and understanding of speed limits applicable in specific areas such as schools, residential areas and crowded places contributes to road safety overall. On the other hand, the lack of understanding about speed limits in these areas could increase the incidence of road accidents. Table 4.11 shows the speed drivers maintain in residential areas and its correlation with their age. The table shows a significant association between the age of the drivers and their knowledge about proper speed limit in specific areas. We found that younger drivers (below 30) largely lack proper knowledge of speed limits in residential areas. However, nearly 90% of the vehicle drivers aged above 30 years have sound understanding of the speed limits. This indicates that the aged drivers are more conscious and careful while driving in residential areas. The youth tend to be less careful while driving vehicles in residential areas. Therefore, policies and awareness programs pertaining to the importance of road safety and speed limits should be launched to target the young population (almost 60% of Pakistan's population). The government should develop strict guidelines regarding the speed limits with a specific focus on residential and other crowded areas to reduce the road crash ratio.



## 4.12 Possession of Driving License by Professions

Profession	Do you have a driving license?				Total
	Yes	No	In process	Learner	
Government employee	222	88	16	10	336
	66.1%	26.2%	4.8%	3.0%	100.0%
Student	377	669	106	34	1186
	31.8%	56.4%	8.9%	2.9%	100.0%
Driver	382	129	97	4	612
	62.4%	21.1%	15.8%	.7%	100.0%
Professionals	105	82	6	4	197
	53.3%	41.6%	3.0%	2.0%	100.0%
Private employee	78	59	9	4	150
	52.0%	39.3%	6.0%	2.7%	100.0%
Business	77	36	13	5	131
	58.8%	27.5%	9.9%	3.8%	100.0%
Total	1241	1063	247	61	2612
	47.5%	40.7%	9.5%	2.3%	100.0%

Driving licenses are important indicators of the competence and ability of drivers for operating a vehicle on the roads. The possession of licenses is mandatory for drivers on the roads, and driving without a license is subject to penalties. We collected data from people belonging to different backgrounds and professions and cross-tabulated this with their holding of licenses. The cross-tabulation shows the relationship between whether or not licenses were held by drivers surveyed in this study and their professions. According to this table, 40.7% of the respondents did not possess driving license across different professions. A major percentage of student drivers tended to drive without licenses (56.4%) with lower percentages of professionals (41.6%) and private employees (39.3%) also driving without licenses. These percentages are very alarming and indicate why Pakistan has a very high ratio of crashes on the roads. It is also an indication of the lack of check and balance by the authorities regarding mandatory licensing for the drivers. The government and authorities should implement strict measures to enforce the mandatory requirement of licenses for all drivers so that the ratio of road accidents is reduced. There is a need for specific focus on young drivers who drive on the roads without a license and put their own lives and those of others in danger.

### 4.13. Holding of Driving License and Driving Experience

Driving experience is also an indicator of possessing a license. An experienced driver is expected to possess a license, whereas the expectation may be lower in the case of a novice driver.

Driving experience Duration	Do you have a driving license?				Total
	Yes	No	In-process	Learner	
Less than 1 year	14	29	11	3	57
	24.6%	50.9%	19.3%	5.3%	100.0%
1-2 years	175	280	72	24	551
	31.8%	50.8%	13.1%	4.4%	100.0%
3-5 years	331	424	76	21	852
	38.8%	49.8%	8.9%	2.5%	100.0%
6-10 years	407	298	67	13	785
	51.8%	38.2%	8.5%	1.7%	100.0%
11-15 years	162	50	9	3	224
	72.3%	22.3%	4.0%	1.3%	100.0%
16-20 years	105	20	5	1	131
	80.2%	15.3%	3.8%	.8%	100.0%
More than 20 years	75	4	0	0	79
	94.9%	5.1%	0.0%	0.0%	100.0%
Total	1269	1105	240	65	2679
	47.4%	41.2%	9.0%	2.4%	100.0%

A major percentage of drivers in Pakistan do not possess driving licenses. It was also essential to know the duration non-licensed drivers had been driving on the roads. For this purpose, we cross tabulated (see table above) the duration of driving experience with possession of driving license of our respondents in different cities of Pakistan. Table 4.13 shows that nearly 50.9% of the respondents driving vehicle for more than three to five years did not possess any driving license. This is a significant percentage of drivers driving on the roads without any license. This also indicates a lack of check and balance and enforcement of mandatory licensing. More than 25 thousand lives are lost every year due to road crashes (WHO, 2018). On the other hand, nearly half of the drivers surveyed reported that they did not possess driving licenses. If the government and concerned authorities do not take strict measures to ensure mandatory licensing of every driver, the situation of road safety is expected to get worse in the future.

### 4.14. Fastening the Seat Belt and Driving Experience

The relationship between driving experience and the possession of driving license is akin to a similar kind of relationship between driving experience on the roads and the use of seatbelts. An experienced driver may be expected to wear a seatbelt during a ride, while an inexperienced driver may not.

Driving experience Duration	Do you fasten a seat belt while driving?					Total
	Always	Often	Sometimes	Rarely	Never	
Less than 1 year	14	8	5	2	12	41
	34.1%	19.5%	12.2%	4.9%	29.3%	100.0%
1-2 years	187	87	89	23	100	486
	38.5%	17.9%	18.3%	4.7%	20.6%	100.0%
3-5 years	265	136	171	52	142	766
	34.6%	17.8%	22.3%	6.8%	18.5%	100.0%
6-10 years	313	141	122	34	110	720
	43.5%	19.6%	16.9%	4.7%	15.3%	100.0%
11-15 years	104	39	19	14	36	212
	49.1%	18.4%	9.0%	6.6%	17.0%	100.0%
16-20 years	77	18	13	2	16	126
	61.1%	14.3%	10.3%	1.6%	12.7%	100.0%
More than 20 years	44	10	6	1	10	71
	62.0%	14.1%	8.5%	1.4%	14.1%	100.0%
Total	1004	439	425	128	426	2422
	41.5%	18.1%	17.5%	5.3%	17.6%	100.0%

The above cross-table (4.14) shows the association between driving experience and seat belt use while driving. The purpose of this crosstabulation is to know how seat-belt use varies in correspondence with different durations of driving experience. As the crosstabulation above shows, a direct relationship exists between driving experience duration and the wearing of seatbelt. As driving experience increases, the practice of using seat-belt also increases. According to this table, 29.3% of the respondents with driving experience of less than a year never use seatbelts. The reason behind this attitude might be the risky attitude of the inexperienced drivers who tend to consider the use of seatbelt unimportant. They tend to use seatbelts if they see wardens checking commuters for use of seatbelt, while most of the drivers take it off as soon as they cross the checkpoint which is a very risky behavior. Similarly, 18.5% respondents with 3-5 years' experience and 15.3% respondents with 6-10 years driving experience neglect to use seat belts. This table shows that the new learners who have less experience of driving tend to ignore this safety measure. Hence, measures should be taken to promote and impose the use of mandatory seatbelt use for everyone.

#### 4.15. Possession of Driving License in Metropolitan Cities of Pakistan

The attitude towards road safety varies across places and people belonging to different groups. Therefore, it is essential to gauge the attitude and practices of people towards road safety across different areas to devise area-specific policies and measures for reducing ratio of road crashes. For this purpose, we analyzed the possession of driving license amongst the people in different cities of Pakistan.

City	Do you have a driving license?		Total
	Yes	No	
Islamabad	218	98	316
	69.0%	31.0%	100.0%
Karachi	384	252	636
	60.4%	39.6%	100.0%
Lahore	250	450	700
	35.7%	64.3%	100.0%
Peshawar	273	282	555
	49.2%	50.8%	100.0%
Quetta	220	138	358
	61.5%	38.5%	100.0%
Total	1345	1220	2565
	52.4%	47.6%	100.0%

As mentioned earlier, driving license is a prerequisite and fundamental requirement for road safety. Legally, a person cannot drive until he obtains a driving license. The table above sheds light on driving licenses in the five metropolitan cities of Pakistan. The table shows that in Lahore (the capital city of Punjab), 64.3% drivers do not possess driving licenses. It highlights the weak check-balance mechanism adopted by the city authorities. Similarly, many drivers in Peshawar (50.8%), Karachi (39.6%), Quetta (38.5%), and Islamabad (31.8%) do not possess driving licenses. It is an alarming situation that the majority of the drivers in metropolitan cities of Pakistan do not have a driving license. If strict measures are not taken as to mandatory licensing of drivers by the government, the road safety situation could deteriorate further in Pakistan.

#### 4.16. Holding Driving License and Fastening the Seat Belt

Adequate knowledge about road safety reduces the chances of road accidents. Understanding the importance of using seatbelt while driving offers multiple advantages. It safeguards drivers during collisions and reduces the chances of serious injuries. It also keeps drivers safe from being thrown out of the vehicle in case of accidents.

License	Fasten the seat belt while driving					Total
	Always	Often	Sometimes	Rarely	Never	
Yes	670	235	193	61	118	1277
	52.5%	18.4%	15.1%	4.8%	9.2%	100.0%
No	303	185	200	69	304	1061
	28.6%	17.4%	18.9%	6.5%	28.7%	100.0%
Total	973	420	393	130	422	2338
	41.6%	18.0%	16.8%	5.6%	18.0%	100.0%

Despite the importance of using seatbelts, the drivers tend not to use seatbelts. The cross-tabulation above highlights the association between possessing a driving license and attitude towards using seatbelts. The tables show that the drivers who possess driving licenses use seat belts while driving. There is an association between attitude of drivers towards using seatbelts and driving licenses. If the licensing system is improved, then it can ameliorate the worsening situation of road safety, thus reducing road traffic accidents and making roads safer for use. This study found that drivers who possess driving licenses are sensitized to the need to use seatbelt while driving, whereas those who do not have a driving license are not sensitized in the same way. The ratio of drivers who have driving licenses and never wear seatbelt to those who do not have a driving license and never use their seatbelts is 9.2% to 28.7% respectively. Almost half of the drivers have a driving license and they make regular use of seatbelts. The possession of driving license indicates that the driver has enough knowledge about road safety and road use because he has undergone different knowledge tests in police coaching centers during the process of securing a driving license. However, unlicensed drivers should be educated about road safety and the importance of wearing a seatbelt. They should also be stopped from driving on the roads without any license.

## Conclusion

The study of the perceptions of road users in five metropolitan cities of Pakistan was conducted to assess their Knowledge, Attitude, and Practices regarding road safety. Our working thesis was that the average member of the public resists measures to regulate transportation and has a casual attitude towards adopting the best practices of road use. It was also assumed that the lack of driver training, inadequate legislative deterrents, insufficient knowledge of road safety practices, negative attitude towards safety measures, and outdated road safety policies were imperiling road safety in the metropolitan cities of Pakistan. The initial assumptions were confirmed by the data collected from the field which showed poor awareness of road safety, with a striking 67 percent of the respondents claiming that destiny, rather than human error, causes road accidents. The data collected on road safety from these metropolitan cities suggest that a significant majority of the drivers drive without licenses. In addition to this, the violation of traffic rules such as traffic signal violation, misuse of lanes, taking wrong U-turn, use of mobile phone during driving, and inadequate use of indicators comprise common driver and commuter practices. The tendency of motorbike users to ride their vehicles on the highways without wearing safety helmets costs many lives in accidents every year. The study also found a striking gap between the knowledge and practice of commuters about road safety, with the data further suggesting that while most of the commuters and drivers were aware of the speed-limits in residential areas and need for child seat belts, they were less inclined to follow the rules.

Data suggest that despite the clear violation of traffic rules, there is little effort on the part of the enforcement agencies to enforce the laws, thus resulting in the loss of thousands of precious lives each year. Along with the lack of will on the part of the law enforcement agencies to implement traffic laws, the commuters are equally responsible for



the worsening situation. Further, the lack of parking areas and unsafe road infrastructure in the densely populated metropolitan cities of Pakistan also contribute to the incidence of casualties in road accidents. Last but not least, due to the public preference for easily available alternative and comfortable transport services like Careem and Uber over public transport, the roads become congested, thus increasing the likelihood of road accidents.

Viewing road accident casualties as a public health concern is imperative as it leads to the loss of thousands of lives each year, while also causing injuries or disabilities. The government needs to treat road safety as a matter of urgent concern and take immediate measures to address this matter as soon as possible. United States has emerged as a champion of road safety by disseminating media messages aimed at making the masses more aware to the use of seatbelt and observance of speed limits. In line with this, this study suggests the adoption of a model that not only raises awareness through media messages but also through integrating road safety into the curriculum at schools, colleges and universities. As density on roads is one of the major causes of road accidents and casualties, the research team proposes a Centralized Parking System that can also prevent road accidents. To complement this policy, the study also recommends the deployment of the Smart Public Transport System—a prototype model proposed by the research team—which can ensure road safety on dense roads in the urban areas of Pakistan.



IN METROPOLITAN CITIES OF PAKISTAN **ROAD  
SAFETY**

**PART II**

# **POLICY INTERVENTIONS: PROPOSED MODELS FOR ROAD SAFETY**

## MODEL 1

### 5.1 Smart Parking Model for Islamabad

In densely populated urban areas, parking of vehicles is a challenge. Almost every family has private vehicles, ranging from motorbikes, scooters, cars to SUVs. Due to the construction of shopping malls, business empires and plazas, congestion has increased in the cities. People who visit these areas experience great trouble while parking their vehicles. A smart parking system can help to minimize these parking problems. In the modern world, cities are growing rapidly and becoming densely populated which creates a major challenge in terms of adequate parking space. There is a dire need to avoid the wastage of space in open parking places which can be done through multi-story parking. In parking places, this system will prove to be useful for reducing wastage of parking places as the vehicles will occupy the facility to full capacity. Owing to these problems, smart parking is a useful idea for managing the density and safety of vehicles. Smart parking is a widely practiced model in Western countries. It helps to improve the parking situation, especially in populated areas. For convenient parking, there is a need to formulate a strategy to resolve the poor traffic situation on the roads.

#### 5.1.1 Smart Plans of Vehicle Parking

Herein is a proposed idea/ strategy for public parking that makes use of some key concepts:

##### 5.1.1.1 Multi-Storey Parking Plazas

Constructing parking areas is not particularly challenging. However, the challenge is the location of the parking areas. For this, one strategy can be to construct multi-story parking lots. In busy centers and business as well as retail areas, this model of parking can be introduced. After selection of the multi-storey parking plaza site, the most significant problem is to locate vehicle entrances so that disruption to traffic and pedestrians is kept to a minimum. As a solution, such entrances can be situated on a side street or service road rather than on the main road. Thus multi-level vehicle parking may help to reduce the space being used. Many vehicles can be parked according to the requirements. This makes the whole system modern and space and time-effective. The idea can be developed by



The image above gives an impression of parking lots built on top of the roads. Traffic challenges and car robberies can be prevented to a great extent by constructing appropriate multi-story car parking plazas.

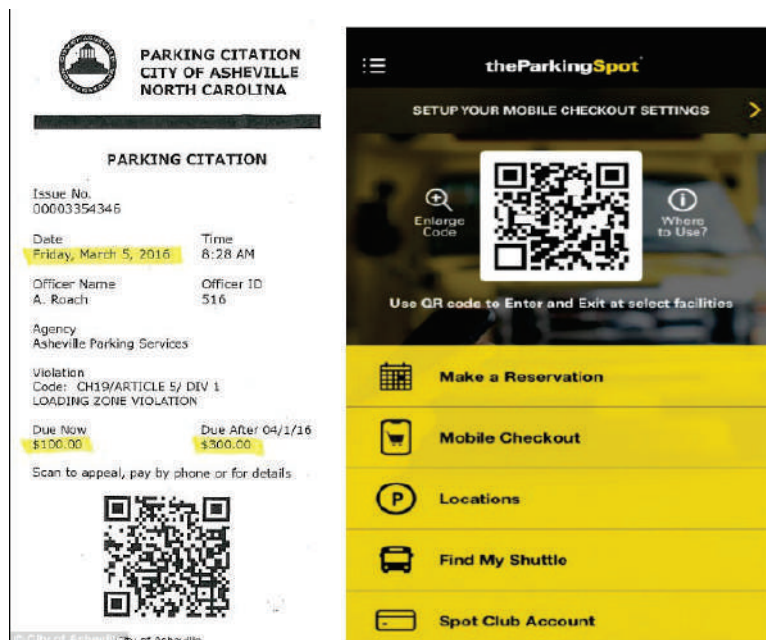
### 5.1.1.2 Possibilities of Developing Feasible Models

A manual model needs to be worked out through Public-Private Partnership (PPP). According to this plan, businessmen or entrepreneurs may partner with Government and sign a contract to build parking lots. They may run the facility for a time period. However, following this, they are obliged to hand over the facility to another company or directly to government which will be responsible for its maintenance and functioning. Funding models can take any of the Public Private Partnership (PPP), if the Government lacks funding:

- BOT (Build-Operate-Transfer)
- BOOT (Build- Own-Operate-Transfer)
- BLT (Build-Lease-Transfer)
- DBOT (Design-Build-Operate-Transfer)

### 5.1.1.3 QR Code

To make these multiple storey parking functional, there is a need to align them with smart technology. QR codes may be linked through smart phones or websites to book the parking space in advance at shopping malls, nearest multi-story parking in the area, company or any relevant area where a person wants to go. In case of lack of access to active internet, commuters will be required to secure their place when they arrive at the facility. At parking entrances, LCDs may be displayed for showing the number of vehicles on each floor/ open parking space. At this step, the users will receive a manual QR slip which is needed to activate the reserved parking spot.



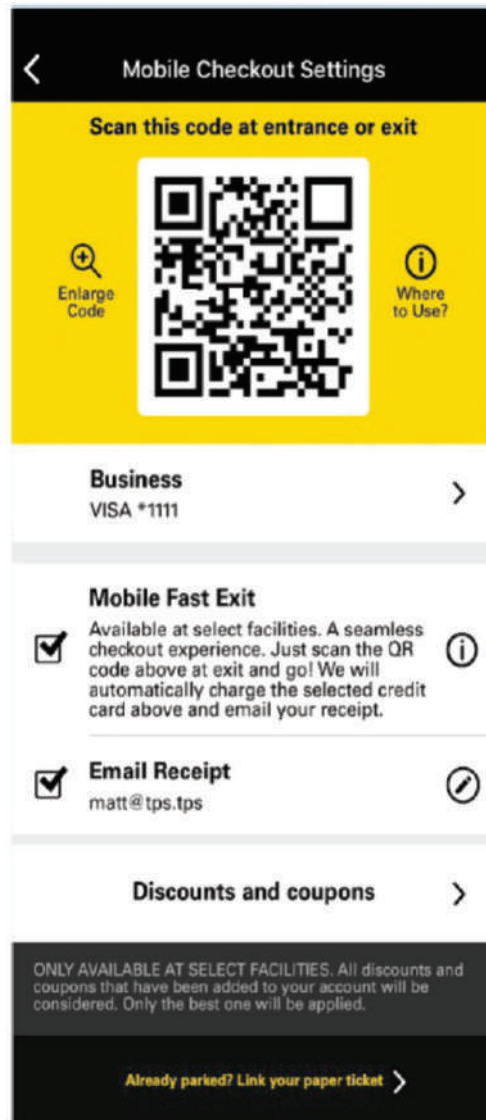


The images above show the sample parking reservations. The facility will have several facilities for a citizen and will prove beneficial in a number of ways:

1. Pre-empt car theft
2. Prevent traffic congestion
3. Support pedestrian-friendly environment on streets
4. Provide car parking nearest to services and amenities

#### 5.1.1.4 Usage of QR Coupon

Once the coupon is purchased, customers will enter the reserved parking lot, scan the QR Code and get access to entry in parking area wherein the space is already reserved. The image below shows the sample QR coupon for securing entry. Islamabad Traffic Police has introduced it in the Islamabad Sunday Bazar (Market) and will launch it in other areas of Islamabad with the cooperation of JS Bank at H-9 sector.



#### 5.1.1.5 Bar Code in Parking Lot

Bar code will be generated and used for the identification of vehicles which have paid the parking charges in a specific area for a specific time period. For this, sensors will be installed for easily tracking the vehicle. Another major cause of traffic blockage is a self-generated public stops. The solution is shared below:

#### 5.1.1.6 Temporary Parking

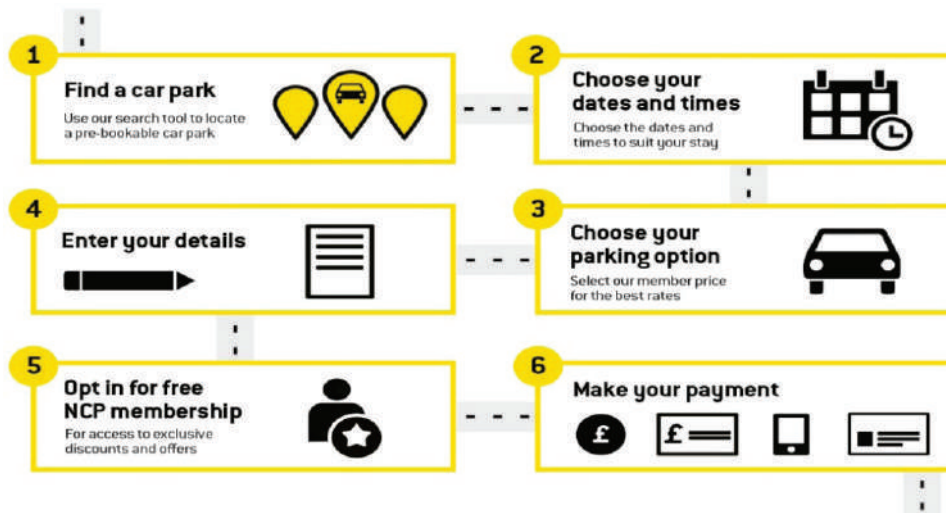
Public transport is considered to be a leading cause of road accidents and road congestion. There is a need to assign designated points at which public transport may stop the vehicle to pick up and drop off the passenger. This sort of stop is in evidence near Serena hotel.

### 5.1.2 Mobile Application for Smart Parking

This plan can be made functional through the use of “Park App”. Smart phone users may install the App on their mobile devices. Whenever they want to go somewhere, they can check available parking spaces and reserve them for their vehicles.

#### 5.1.2.1 Advance/ Pre-booking

People will be able to book the parking slot in advance. As shown in the figure below, this method of Pre-booking would allow the user to reserve the desired parking space for a particular time period and pay the bill through the Smart Application. This would be ideal for airport parking, shopping malls, events, festivals and city breaks.



#### 5.1.2.2 Feasibility

The idea of smart parking is not novel. The key point is its feasibility (which can be rare) while designing the plan. As discussed earlier, road safety is a burning issue in Pakistani society. To address this, it is essential to manage the system of roads by employing or introducing centralized systems. With regard to this issue, the Department of Sociology, Quaid-e-Azam University Islamabad took the initiative to introduce the Centralized Smart Parking System, Centralized

Public Transport System, Centralized Licensing System, Legislation and Awareness proposals. The feasibility of Smart Parking System is discussed below. The components of this system are:

### 5.1.2.3 Multi-Storey Parking Plazas

Initiative can be launched with the help of Public Private Partnership Stakeholders comprising:

- a) Designer/ Architectures
- b) Builders/ Contractors/ Civil Engineers
- c) Software Engineers

### 5.1.2.4 Introduction of Technology in Smart Parking

- a) QR Coding
- b) Bar Coding
- c) Mobile Application

In the first instance, the planning phase would involve multiple stakeholders who have their own area of expertise. For instance, in Islamabad, the Capital Development Authority would be a fundamental stakeholder with the ability to specify the area in which the plan of road safety could be implemented. After that, the designer or architect would design the frame of the parking facility and estimate the cost of each floor in terms of technical expertise, materials, labor and logistics. Based on these plans, civil engineers and builders would implement the design.

Smart plans will be introduced and implemented here. To introduce the smart plans, software engineers will be required to design the SMART idea in the parking lot as well to install the CCTV. With the help of above-mentioned stake holders, the cost estimated by this study is detailed below:

1. Capital Development Authority (CDA)
2. Owner of already constructed parking lots
3. Architectural Engineers
4. Civil Engineer

We collected the data from the following authorities:

1. From the authorities of CDA's planning department
2. TTS (construction company of overhead bridges and roads)
3. Chief Engineer (Centaurus)
4. Design men Consultancy
5. NESPAK Islamabad Office

### 5.1.2.5 Estimations from Private company

We calculated the costs at about eight lacs per square yard in 2020. The rough estimation of the construction of multi-storey plaza in Blue Area is appended below:

Total Space 170X170

Rate of Construction/sq ft= 5000/-

Total cost of construction of 11 story parking plaza=  $11 \times 170 \times 170 \times 5000 = 1589.5$  million PKR

Please note this estimation is provided by a private company.

### 5.1.2.6 Public Sector Estimation

Another estimate by a public sector organization is presented below:

This is for 5 floors: ground+ 4floors

For: 1,26,720 sq ft

Tentative cost of parking plaza:

126720 X 2500

Rs. 316800000 that is 316.8 million

This is the input that will be required to construct the parking plaza if the Government of Pakistan chooses to undertake the construction itself.

### 5.1.3 Output

Initially, to make the plan successful, there is a need to charge a parking fee. This will help to make the system centralized and channelize it in systematic way. As per private sector estimation, if we construct one parking plaza of 11 floors and dedicate 3 floors for permanent parking, we predict revenue generation as below (hypothetically):

85 vehicles/ floor

255 vehicles on 3 floors

Daily/ Monthly fee: 100/ 3000/ per vehicle on average. However, the costs may fluctuate due to the number of car parking and working days/ peak hours or off days parking. However, the Government can earn about PKR 765,000 per month. This would total PKR 9180000 per year with the amount totaling PKR 550800000 in five years.

**Note:** This model is designed by Hifza Irfan under the direction of Muhammad Zaman/ Imran Sabir.

## MODEL 2

### 5.2 Centralized Public Transport System in Islamabad

Situated on the Pothohar Plateau, Islamabad is a well-planned city in Pakistan. The population of the federal capital has risen drastically since 1998, increasing to 2.1 million according to the 2017 census. In addition to being a Capital city, it has higher demand for mobility due to a shift towards increased urbanization. Similarly, rising income amongst the residents has also boosted personal mobility leading to increased private vehicle ownership and use. Owing to this rise in population and urbanization, the challenges in the city have also increased, particularly the issue of commuter safety. This is because of the consistent increase in the number of vehicles and parallel degradation of the road traffic infrastructure.

Pakistan numbers amongst countries wherein the ratio of fatalities and casualties due to road crashes is one of the highest. According to the Global Safety Report (2018), an estimated 27582 road traffic fatalities occurred in Pakistan. The increase in road crashes is a crucial issue that urgently requires a strategy for improving the road safety situation in the country. To mitigate the externalities of transportation, there is a need to introduce effective principles and a sustainable transport system.

Excessive motorization has contributed to an unsustainable transport system. The major issues pertaining to unsafe transportation include inefficient management of traffic, aged vehicles on roads, poorly maintained flow of traffic along with poor traffic planning, resulting in traffic congestion. This gives rise to environmental pollution, extended travel hours and extra fuel and carbon emissions that deteriorate the environment and impact the health of the general public. Some initiatives have been taken at federal level which include signal free corridors and separate structures at intersections. To an extent, these initiatives have improved the state of transportation but certainly not enough to alleviate the issue. Traffic congestion in the capital is also on the rise. There is a need to take extraordinary measures for ensuring a safer and sustainable transport system without delay and congestion. Thus, this study seeks to propose a plan for improving the road safety situation in the Islamabad Capital Territory (ICT). This is a prototype model for Islamabad that can be applied to other cities later to address the challenges of road safety. Therefore, this project is intended to fulfill the following objectives.

#### 5.2.1 Objectives

- o To provide a high level of services in terms of speed, frequency and easy accessibility for reducing private vehicle dependency.
- o To provide a safe, secure and environmentally sustainable system of public transport.
- o To generate revenue and extra employment using existing resources.

#### 5.2.2 Main Idea of the Project

The core idea of this project is to introduce a Centralized Public Transport System (CPTS) in Islamabad while utilizing existing resources in a well-managed way. For this purpose,



the existing transport buses of the educational institutions in Islamabad will be used. The buses at most of the educational institutions are in operation according to a set schedule. They usually have few shifts and are run at peak hours, while during the rest of the days, the buses are not in operation. This escalates the congestion of traffic at roads. Owing to specific working hours in a day, students have to wait for long hours on campus even after their classes are over. Further, this increases the rush at peak hours and lessens the capacity to provide safe travel. The strength of students is very high, and they do not have sufficient seats on these vehicles. This puts the safety of students at stake and chances of road crashes increase. This situation can also be improved through a centralized public transport system.

This project is aimed at providing a safe and efficient system of transport. Under this project, the buses will be functional from 7 am to 9 pm. Thus, the students with different timings for classes particularly in educational institutions (schools/ colleges/universities) can go back homes when they get free instead of waiting on campus to run to the points. One of the critical challenges in this project is to bring the buses of educational institutions under a centralized system. However, it is imperative to realize that accessing the buses from educational institutions does not mean taking away the transport facility. Rather it means making the transportation system efficient not only for educational institutions but also for the whole city. Islamabad traffic can also be made smooth and well managed. Three buses will be active in each university, acting as a feeder bus to the main highway where other buses will be functional. Students can use the feeder buses to reach the station on the main road and then can easily reach their destination through route buses on highway. The project is self-sustainable, and a significant amount of revenue can be generated, further providing job opportunities to the unemployed.

This project has the following characteristics.

- o Dedicated bus line using existing roads
- o Bus stop after each 500 meters
- o Off-board fare collection with smart card
- o Variable message signs for passengers (VMS)
- o Online driver information and vehicle tracking
- o Optimized public transport network providing coverage to the whole city (Islamabad Capital Territory)
- o Integrated transport network for maximizing ridership
- o High level of service in terms of speed, frequency and easy accessibility to reduce car/motorcycle dependency
- o Safe, secure, comfortable and environmentally sustainable system.
- o Reliable and dependable, meeting needs and aspirations of the community.

### 5.2.3 Details of Public Institution and Transport System

There are 20 public and semi government universities, 68 Islamabad Model Colleges for boys and girls, and 350 model schools in Islamabad. However, all the institutions do not have a transport facility. Only 284 buses and coasters are functional at all these institutions.

Institution Name	Buses	Coasters/HiAce/Wagons
Quaid-e-Azam University	30	18
PIDE	4	3
International Islamic University	103	0
PMAS-Arid Agriculture	9	0
National University of Modern Languages	37	0
Federal Urdu University	4	0
68 Islamabad Model Colleges for Boys and Girls	38	0
COMSATS	13	0
Air University	9	0
Bahira University	12	0
3 Federal Medical and Dental Colleges Islamabad	6	0
Total	265	21

## 5.2.4 Public Transport System

An estimated number of 171 buses will be required to implement the project efficiently, but we may factor in 200 buses in the event of some of the vehicles requiring maintenance or due to extra congestion hours. These buses will cover the major roads (Kashmir Highway, Murree Road, Islamabad Express Way, Jinnah Avenue, Margalla Road) and secondary roads in each sector. They will also be working as feeder buses to the metro bus service. The major proportion of buses will cover the Kashmir highway, Murree road and Islamabad Expressway that in total 60 buses, having 20 for each road. Similarly, 15 buses will be functional on Jinnah Avenue and 15 on Margalla road.

A total of 90 buses are allocated to run on secondary roads within sectors. This includes 18 buses for F sector, 30 for G sector, 15 buses for E sector, 9 for I sector and 9 buses for H sector. Dedicated line will be allocated to the buses on major roads, while within the sectors the same route will be used. There will be a station after every 0.5 km, thus making it possible to reach a station in 3 minutes. The buses will be functional from 7.00 am till 9 pm in the evening. The ratio of buses during peak hours 8-10 and 4-6 will be increased to reduce traffic congestion.

## 5.2.5 Major Roads and their Length

Major Roads	Total Length	Number of Buses
Kashmir Highway	25 Km (G14 to Sarena Hotel)	20
Murree Road	20 Km (Faizabad to 17 Meel)	20
Islamabad Expressway	28 Km (T-Chowk to Faisal Mosque)	20
Margalla Road	16 Km (Service Rd East to Cons. Ave)	15
Jinnah Avenue	7 Km (Service Rd East to-D Chowk)	15
		Total 90 buses

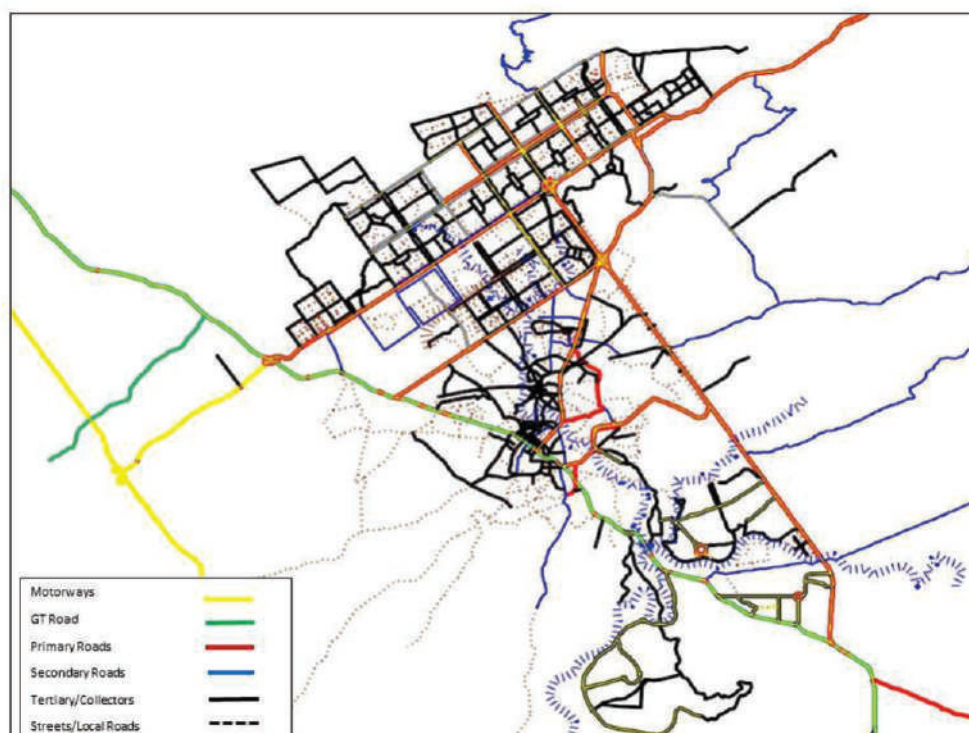
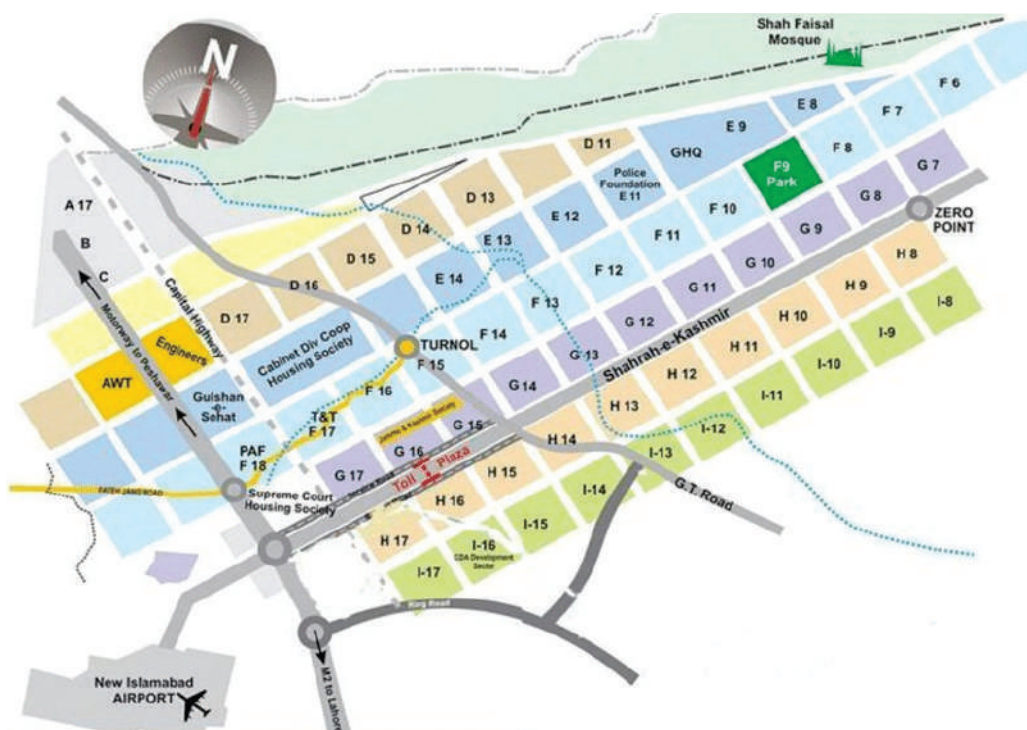
### 5.2.6 Sectoral Details

Three buses will be provided to each sector and the details of the sectors and buses are listed in the below table.

Sectors to be covered	Total Sectors	Required Buses
E Sectors (5,6,7,8,9,10,11)	7	21
F Sectors (5,6,7,8,9,10,11)	7	21
G Sectors (5,6,7,8,9,10,11,12,13,14)	10	30
H Sectors (8,9,10,11)	4	12
I Sectors (8,9,10,11)	4	12
Total Sectors	32	Total Buses 96

- o Residential Sectors 49
- o Institutional Sectors 10
- o Industrial Sectors 3
- o Admin Sectors 4
- o Park Sectors 1
- o Wholesale Sectors 1
- o Army Sectors 4

## 5.2.8 Existing Routes of Islamabad





### 5.2.9 Islamabad Map



### 5.2.10 Existing Public Transport Routes in Islamabad

There are 31 existing routes in Rawalpindi Islamabad controlled by Regional Transport Authority (RTI) Rawalpindi and Islamabad Transport Authority (ITA). In addition, there are 23 functional public transport routes in Islamabad, 10 routes in Rawalpindi and 7 public transport intercity routes. The details of these routes are given below.



**Table 5.2.10.1 Tentative Route Planning**

Sr. No	Route No	Route Area	No of Costars
1	101	Pirwadhai to Faisal Masjid via Pindora, Faizabad, Zero Point, Aabpara, Super Market & Super Jinnah	25 Coasters
2	104	Tarnol to Pak Sectt via G-10/1, G-10-2, G-10/3, G-9/3, PIMS, G-7 Markaz, Lal Quarter, Poly Clinic, Super Market and Pak Secretariat.	24 Coasters
3	104-A	Tarnol to Pak Secretariat via Islamabad Chowk, G-11-1, G-11/4, G-10 Markaz, G-9 Markaz, PIMS, Blue Area, Poly Clinic, Parliament Chowk, Pak Secretariat.	9 Coasters
4	105	G-15 to Pak Secretariat via G/15-G-11/4 District Court G-10 Markaz G-10/2-3, G-9 Markaz, T&T Chowk, G-7/2, Service Road, G-7 Markaz, Lal Quarter, Poly Clinic, Melody, Aabpara, Foreign Office, Secretariat.	50 Wagons
5	105-A	G-15 to Pak. Secretariat via G-15-G-10 Markaz, G-9 Markaz, T&T Chowk, G-7/2, Service Road, G-7 Markaz Lal Quarter, Poly Clinic, Melody, Aabpara Foreign Office, Secretariat	47 Wagons
6	110	Khataar to Pirwadhai More via BoBari, Bara Kahu, Malpur, Rawal Dam Chowk, Faizabad, Pindora, CDA Colony, Pirwadhai More.	151 Wagons
7	111	Rewat to F-8 Markaz, via Islamabad highway, Khanna, Faizabad, Al-Shifa International, Open University, PIMS, F-8 Markaz	60 Wagons
8	113-A	Pirwadhai to Secretariat via I-9, H-9, G-9 Markaz, G-8 Markaz, PIMS, Blue Area, Super Market, Secretariat.	05 Coasters
9	115	Pirwadhai to G-11/1, via I-10, I-9, H-9, G-9 Markaz G-10 Markaz, Golra Chowk, G-11/3, G-11/1	48 Suzuki Pickups
10	115-A	Peshawar to G-14, via Peshawar Morr, G-9 Markaz, G-10 College Road, G-11/4, Chaki Atta, Dhoke Kashmirian, Mera Jaffar, Baras Chowk, Flyover Railway, G-14 Green Built near Water Tanki.	35 Suzuki Pickups
11	120	Hajj Complex to Bari Imam via Golra, F-11 Markaz, F-10 Markaz Karachi Company, PIMS, G-7 Markaz, Aabpara, Foreign Office Bari Imam.	210 Wagon
12	121	Hajj Complex to Faisal Masjid via Kohinoor Mills, Carriage Factory, Pirwadhai more, I-10, I-9, H-9, G-9 Markaz, F-8 Markaz, Faisal Chowk, Faisal Masjid.	24 Wagons
13	121-A	Pirwadhai Morr to Faisal Mosque via Carriage Factory, Pirwadhai More, I-10,, I-9, H-9, G-9 Markaz, F-8 Markaz, Faisal Hcawk, Faisal Masjid	47 Wagons
14	122	Chirah to Pak. Secretariat via Alipur Farash, Taramri Chowk, Chak Shahzad, Rawal Dam, Aabpara, Melody, Super Market, Secretariat.	70 Wagons
15	122-A	Khanna to Pak. Secretariat via Tarlai, Taramri Chowk, Chak Shahzad, Rawal Dam, Aabpara Melody, Super Market, Secretariat.	42 Wagons
16	124	Arri Syedan to Faisal Masjid via Sihala, Islamabad Highway, Khanna, Faizabad, Zero Point, PIMS. F-8 Markaz, Zafar Chowk Faisal Masjid.	80 Wagons
17	127	Chattar to F-8 Markaz, Via Bhara Kau, Malpur, Aabpara, Zero Point, PIMS, F-8 Markaz.	35 Wagons
18	127-A	Bhera Pull To G-11 Via Bhara Kahu Malpur Aabpara Melody Kalsoom Plaza Khyber Plaza, Complex, Itwar Bazar, NHA, PMDC, High Court New Katcheri	27 Wagons
19	128	Gulshan-e-Jinah to Pir Sohawa via Super Market Dhamane Koah Tehlar Chowk Gokina Chowk Hotel Muarrad Gali Pir Shohawa	210 Wagons
20	131	Faizabad to Kurry Sher via Rawal Dam, Chak Shahzad	60 Coasters
21	133	Pirwadhai to Chonpra via I/10-1-2, Police Line, g-11/4-1, f-11 1-2 and Golra Borr Masjid St No. 12, Noor Plaza, Chopra Stop.	64 Coasters
22	136	PWD Colony To Pak Secretariat, via Khanna, Faizabad, Zero Point, PIMS, Khyber Plaza Kalsom Plaza, Poly Clinic, Secretariat.	40 Wagons
23	138	Alipur to g 15 Markaz Via Tarlai, Khanna, Jinnah Town, Faizabad, Pindora, Pirwadhai More, Police Line, Nust, Kashmir Highway, Tool Plaza, 22 No Chungi, G-15 Markaz.	55 Wagons
<b>Total</b>			<b>1418</b>

### 5.2.11 Pre-Requisites

The research team identified the following pre-requisites for the success of this project:

#### 5.2.11.1 Legislation

To implement this project and make it functional, the initial and foremost step is to pass legislation so that universities allow the use of their transport as public transport. The Government of Pakistan may have to pass an Act regarding the use of university buses as public transport. After legislation, the law enforcement agencies should implement this law to make the project functional.

#### 5.2.11.2 Islamabad Transport Authority

Islamabad Transport Authority has to be activated order to make this system functional. They have to develop routines, develop stops, develop apps for online services, decide fare, as well as execute, check and monitor the functioning of the system.

#### 5.2.11.3 Establish Quality Assurance Department

A separate department should be established to monitor the project in order to ensure efficiency and transparency. The department should be divided into the following three branches. These branches should work in collaboration with one another.

#### 5.2.11.4 Human Resource (HR) Branch

The HR branch will appoint drivers, conductors, ticket checkers and will also be responsible for the security of buses. It will also be responsible for dealing with the complaints registered by citizens. A mobile application will be launched containing details of drivers, conductor, bus schedule and providing for online tracking of vehicle. The business will be public, and information about any task accessible through website of the department. This branch will also strictly monitor the priority lines and impose heavy fines and penalties in case of violation.

#### 5.2.11.5 Maintenance Branch

The maintenance branch will focus only on the maintenance of the vehicles including tires, oil, security cameras and other necessary parts of vehicles. Besides, CCTV will be installed on the route of buses and inside the buses. In case of an emergency, this branch will have a mobile workshop for maintenance.

#### 5.2.11.6 Finance Branch

This branch will manage and evaluate the total budget, including salary of the employees and maintenance expenses. Every month, this branch will be responsible for sharing monthly expenditures with the HR branch. The major responsibilities of this branch will be to maintain the record of fuel usage. The cash will be released upon the recommendations of HR branch.

#### 5.2.11.7 Details Operations

This project is self-sustainable as it meets the expenses and generates revenue for the participating educational institutions. The project uses existing public infrastructure and the manpower of the educational institutions. The parliamentary legislation would help to shift the

control of this infrastructure and manpower to Islamabad transport authority. To achieve project goals, the authority would be required to hire additional manpower. The authority will also maintain the security, maintenance, security and assume major responsibility for the project. The revenue of this project would be shared with educational institutions in the form of royalty.

## 5.2.12 Cost and Benefits

This project will cater to the needs of the students, working class and regular commuters who can travel from one place to another on a daily basis within the city on pre-defined routes at predefined time on pre-defined affordable rates. The project can serve 300,000 daily commuters in the twin cities (Rawalpindi & Islamabad) by using three routes and deploying 186 to 200 buses. The three routes cover almost 90 Kms, connecting each other and covering the twin cities with an average of 1500 passengers/bus. This project will target customers by ensuring affordable fares that undercut those offered by the competitors. The project is expected to generate revenues of more than 4 million PKR/day with anticipated expense of around 3 million PKR/day. The present project forecasts per year profits of 300 Million PKR/annum, which will not only boost the economy and uplift business activity but also provide quality, well-managed, safer and affordable transport services. It is suggested that a pilot program should be run to ensure fleet health, scheduling, and other important measures. The prototype can be run for at least 6 months before the rolling out of the master plan. This service will ultimately be the best public transport service, providing affordable, environmentally-friendly and safe commute to our society.

The ICT administration will impose a carbon emission tax to reduce and discourage private vehicles. Moreover, this project would help to reduce the traffic burden on main roads of the city and reduce carbon emission in the city. The reduction of carbon emission would help to improve the air quality index (AQI) of Islamabad and surrounding areas.

**Note:** This model is designed by Muhammad Farooq under the direction of Muhammad Zaman/Imran Sabir.

# MODEL 3 AWARENESS ON ROAD SAFETY

## 5.3 Introduction

Road safety is a pressing and complex issue in Pakistan with immense social and economic ramifications, including loss of precious human life. Approximately, 3400 people die every day on the world's roads and 10 million people are injured and badly disabled due to road accidents. In Pakistan, according to World Health Organization statistics, 30,310 people die yearly. This means that 20 people out of 100,000 die in road accidents every year, and this means that Pakistan is ranked 67th globally for a higher incidence of road accidents. In Pakistan, the Punjab province has the highest number of road accidents as compared to other provinces such as Sindh, KPK and Baluchistan. The main causes behind severe accidents and crashes include over speeding, drivers' carelessness, violation of traffic rules and use of old vehicles. The Islamabad Excise and Taxation Department has reported that increasing road accidents in the country are attributable to the large number of old and unfit vehicles operating on the roads. For instance, more than half of the total registered automobiles are thirty or more than thirty years old, thus leading to road fatalities. Due to road traffic crashes, there are resulting economic losses experienced by victims' families, society and the nation, amounting to a 3 % loss of GNP.

### 5.3.1 Identifying the Problem

The citizens of Pakistan lack knowledge about traffic rules, and pedestrians and cyclists are amongst the most affected victims of road accidents. Creating road safety awareness and educating school children with the knowledge, skills and positive attitude can enable this group of vulnerable road users to protect themselves. This is particularly true because drivers and pedestrians lack sufficient knowledge about traffic and driving in Pakistan.

In terms of attitudinal and behavioral issues, the study found that untrained drivers tend to drive their vehicles aggressively. The different negative behaviors of drivers transpire due to the influence of their backgrounds. Social and cultural issues lead to the development of bad driving habits amongst drivers. Institutional issues also exist as there is a lack of focus on road safety, poor organization, and reliance upon short term strategies that are only implemented for limited periods of time. Executive issues include inadequate human resource management and lack of professional traffic wardens. Poor and delayed implementation by the government also remains a problem. This is indeed a side-effect of lax political will and ever-shifting economy.

### 5.3.2 Implementation Issues

According to the findings of recent research by Quaid-e-Azam University Islamabad in the metropolitan cities of Pakistan, 80% of the respondents had not attended seminars or training sessions on road safety. The majority of people were unaware of traffic rules and regulations and did not realize its importance. The reasons behind not attending any training session or seminar was the lack of government attention to road safety programs, dearth of facilities and lack of interest amongst drivers towards road safety.

In this model, there are some modes of awareness by means of which the poor situation of road safety can be addressed. All these points are discussed below.

### 5.3.3 Objectives and Main Focus of the Model

The emphasis of this model is on all stakeholders. The key objectives are:

1. Need to develop conscious behavior and attitude towards risk awareness, personal safety and safety of other road users.
2. Need to catalyze improvement through teaching and practice.

### 5.3.4 Focus of Awareness and Road Safety Model

KNOWLEDGE	SKILLS	ATTITUDE
<ul style="list-style-type: none"> <li>• Traffic rules and regulations</li> <li>• Results of risky behaviour</li> <li>• Consideration of mobility patterns and consequences</li> <li>• Health risks pertaining to traffic in terms of ecology finance</li> </ul>	<ul style="list-style-type: none"> <li>• Development of self-evaluation</li> <li>• Motor vehicle skills</li> <li>• Assessment of distances and speed</li> <li>• Deliberation/reflectivity</li> </ul>	<ul style="list-style-type: none"> <li>• Acting as role model for others to practice road safety safely and in socially responsible ways.</li> <li>• Motivation to obey rules and regulations and to avoid a risky attitude.</li> <li>• Guarantee</li> </ul>

### 5.3.5 Traffic Education Guidelines for Children in Schools

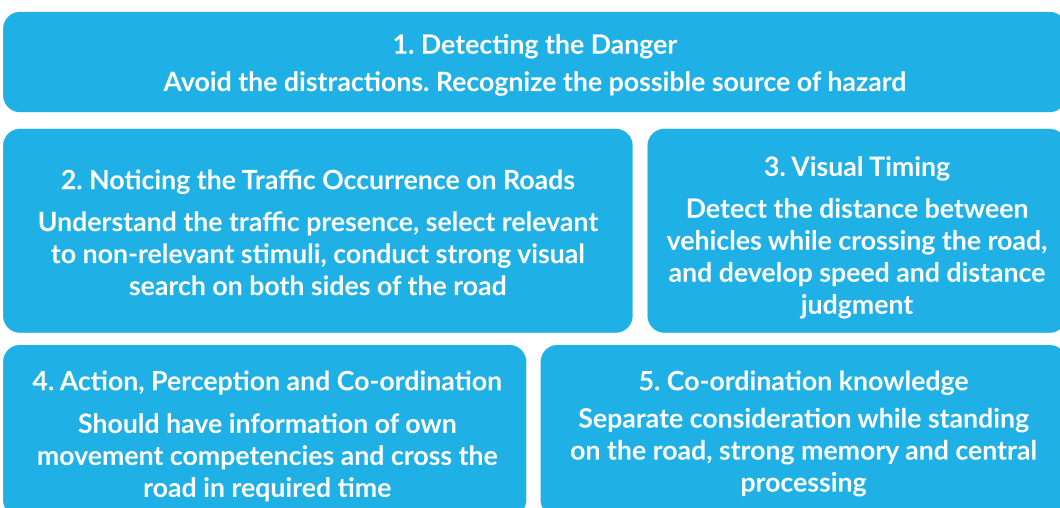
Road safety can be materialized if it is taught as a mandatory subject in every school throughout Pakistan. Its implementation should be made compulsory. Teaching road safety measures to adolescents can reduce traffic accidents. Hence, the teachers can play a vital role in creating road safety awareness.

- They should integrate road safety education into the curriculum and traffic guidelines should be shared with every child.
- Appropriate training should be provided to teachers, so that they can provide road safety education.
- During morning assembly, children shall learn to memorize basic road safety rules. Children must learn these rules in an educational environment.
- Make guidelines for safe journey of children because it is the shared responsibility of parents, children's, school management and authorities to increase the purposeful education to get rid of the death or injury to children and others on road.
- Thought-provoking questions such as when to cross the zebra lines, when to stop on the road, where to walk on the street, where to look while crossing the road and how to



stop the vehicle should be posed to the children. When children are with their parents or caretakers, they should be asked to wear their seatbelts, taught how to exit from the car in a safe zone. They should learn about different vehicles and speed limits and should also be taught not to throw anything on the road which distracts the drivers.

- Such safety readiness can be successful if parents are involved. Parents can serve as role models in road safety education. For instance, if parents routinely follow the traffic rules, their children are likely to do so too.
- Discussion sessions about road safety may be arranged by the school management with parents and children on a monthly basis.
- The school management should partner with local community organizations like Edhi or government agencies such as the rescue agency or city traffic wardens to raise road safety awareness.
- The school management should contribute to road safety process by rewarding children who participate and practice road safety by issuing safe behaviour certificates.
- Authorities should make strategies, policies and give them resources for learning. They can create places in parks where teenagers can learn while playing.
- Traffic police can play an important role in educating children in all provinces by imparting training at schools. The results and effects are likely to be long lasting. The motorway police may design a curriculum which can be shared with the school management.
- In training sessions, sharing videos about traffic rules can motivate students to abide by the traffic rules and regulations to prevent tragic accidents in the future.
- Traffic police should distribute copies of the rules and regulations to the trainees offer the training session.
- Knowledge of basic skills in road safety (e.g. crossing the road) should be imparted to pedestrians, particularly children who are the most vulnerable group amongst the latter.



## 5.3.6 Traffic Education Guideline: Goals and Content for the Youth

The biggest challenge is to change the attitude of adults. Road accidents constitute one of the leading causes of death amongst youth. In comparison with females, male adults are more affected by safety lapses on the roads. This is an alarming situation for Pakistan as well as for the youth. Through the application of relevant strategies and measures, injuries and death can be reduced.

### When obtaining the licence or immediately after obtaining a license

Education and awareness alone cannot be successful. We need to build capacity in the system through driver training. In Pakistan the licensing system is weak. It is necessary to build a strong license and strict system.

### Process for commercial drivers (trucks) or commercial vehicles (passenger cars)

To teach skills and knowledge for passing the basic driving test organized by the licencing authority, there is a need to give them a deeper understanding of rules and regulation. Teach them to participate in a traffic community and consider not just their own safety but also the safety of others. Teach them how to detect dangerous hazards. They should be aware of their responsibilities. The traffic police should arrange awareness campaign for HTV or LTV drivers as they are mostly involved in road accidents through overloading.

## 5.3.7 Organize Road Safety Seminars and Lectures in Colleges and Universities

Pakistani universities and colleges can organize the seminars in collaboration with the National Highway Authority (NHA) and the Motorway traffic Police. Media anchor persons should be invited to address the youth. Through informative and motivating speeches and lectures, students should be educated as to the different aspects of road safety. They should be invited to commit to complying with speed limits and avoiding the use of mobile phones while driving a vehicle. Through these initiatives, the audience may be sensitized to the alarming situation of road safety. The Department of Education should be taken on-board to make the campaign effective and meaningful.

### 5.3.8 Role of Electronic, Print and Social Media

Media is a strong agent of socialization as almost everyone has access to television, mobile and newspapers. Through media, we can deliver strong messages and create awareness for sensitizing commuters. With the help of media persons, we can direct the attention of the government to this issue.

Electronic media	Social Media	Print Media
<p>In daily news, 5 to 6 accidents incidents are reported. Through electronic media campaigns, the issue of road safety can be addressed as it is the biggest platform of awareness.</p> <ol style="list-style-type: none"> <li>1. The majority of the people watch morning shows and talk shows in prime time. If they discuss road safety issues, viewers will surely understand and be influenced by this epistemic source. The producers of these shows should invite Traffic police should join the show and discuss the issue openly. Through these shows the public can be sensitized.</li> <li>2. Electronic media with the collaboration of Motorway Traffic Police, National Highway Authority and with the help of Government should broadcast road safety advertisement messages on all TV channels for each age group whether they are drivers, pedestrians or cyclist. The messages should include information about speed limit, seat belts, helmets, how should drive in rainy weather, knowledge about overloading, over speeding, how to cross roads and knowledge about traffic rule violation penalties.</li> <li>3. ITF should make a separate channel related to traffic road safety</li> <li>4. During driving, most drivers listen to radio; so Radio channels need to discuss road safety content and create messages for the listeners.</li> </ol>	<p>The majority of the youth use social media and social media has a strong impact on daily life. Through social media, we can start a road safety campaign.</p> <ol style="list-style-type: none"> <li>1. Make and share Road Safety video's messages with Road safety hash tag.</li> <li>2. Create a debate on type of content in Urdu and English on Facebook.</li> <li>3. Provide information regarding Road Safety issues and reasons behind severe road crashes.</li> <li>4. Share online road safety bloggers links on Facebook for the sake of awareness.</li> <li>5. Create traffic rules and regulation pages and groups on Facebook.</li> </ol>	<ol style="list-style-type: none"> <li>1. Road safety issue and problems should be discussed by columnists in their columns. These should be available on each newspaper, and we need to sensitize readers towards this issue. Based on their reading, people will surely be persuaded to obey traffic rules.</li> </ol>



# ROAD SAFETY IN METROPOLITAN CITIES OF PAKISTAN

Example of How Road Safety Awareness can be created through news columns and awareness messages on Social Media



## 5.3.9 Awareness Programs for Public

- Most people in Pakistan read and understand the Urdu language rather than English. Therefore, traffic police should run a campaign for distributing Urdu language traffic rules handbooks to drivers on roads. This would enable drivers and pedestrians to easily memorize the basic and most important rules and regulations.
- Urdu language traffic signs must be posted on the roads and highways.

- Roadside banner campaigns should be run to raise road safety awareness.
- Pamphlets on importance of road safety should be distributed in schools, colleges, universities and offices.

### 5.3.10 Ensuring Strict Law Enforcement and Deterrence

There are numerous traffic laws and regulations in Pakistan, but there is no law on awareness. The government needs to develop a framework for creating awareness of road safety laws in Pakistan. This can be done through legislation, policy and enforcement. Further, the government should celebrate one day as “Road Safety Day” as it is a pressing concern for Pakistan. In this way, each institution may play its part in running Road Safety campaigns.

### 5.3.11 Creating Smart Apps on Road Safety

With the help of traffic police, we need to create mobile software and apps for road safety. These apps should contain information regarding road safety and enable users to access the latest road safety news and alerts, available stories from crash survivors and news on the death of victims. Once the app has been launched, the content may be published in a handbook.

**Note:** This model is designed by Sadia Aslam under the direction of Muhammad Zaman/ Imran Sabir.

## REFERENCES

- Ababa, A. (2015). Status of Implementation of the African Road Safety Action Plan (2011-2020). UN Economic Commission of Africa. P:7-17.
- Achterberg, F. (2007). Raising compliance with road safety law: 1st road safety PIN report.
- Ahmed, A. (2007). Road safety in Pakistan. Islamabad: National Road Safety Secretariat.
- Alkheder, S. A., Sabouni, R., El Naggar, H., & Sabouni, A. R. (2013). Driver and vehicle type parameters' contribution to traffic safety in UAE. *Journal of Transport Literature*, 7(2), 403-430.
- Almqvist, S., & Hydén, C. (1994). Methods for assessing traffic safety in developing countries. Lund University, Lund Centre for Habitat Studies.
- ARTBA. (2010). Roadway safety policy. Retrieved on December 20, 2019 from <https://www.artba.org/government-affairs/policy-statements/roadway-safety-policy/>
- Asian Development Bank . (2010). Sustainable Transport Initiative of Asian Development Bank. Workshop on Future Support for Transport in the People's Republic of China. Changsha: Asian Development Bank.
- Banik, B. K., Chowdhury, M. A. I., Hossain, E., & Mojumdar, B. (2011). Road accident and safety study in Sylhet Region of Bangladesh. *Journal of Engineering Science and Technology*, 6(4), 493-505.
- Batool, Z., Carsten, O., & Jopson, A. (2012). Road safety issues in Pakistan: a case study of Lahore. *Transportation planning and technology*, 35(1), 31-48.
- Bezerra, B. S., Kaiser, I. M., & Battistelle, R. A. G. (2015). Road safety-implications for sustainable development in Latin America. *Latin American Journal of Management for Sustainable Development*, 2(1), 1-18.
- Bhatti, M. A., Ajaib, M. K., Masud, T. I., & Ali, M. (2008). Road traffic injuries in Pakistan: Challenges in estimation through routine hospital data. *J Ayub Med Coll Abbottabad*, 20(3), 108-111.
- Bishai, D., Hyder, A. A., Ghaffar, A., Morrow, R. H., & Kobusingye, O. (2003). Rates of public investment for road safety in developing countries: case studies of Uganda and Pakistan. *Health policy and planning*, 18(2), 232-235.
- Bliss, T., & Breen, J. (2009). Country guidelines for the conduct of road safety management capacity reviews and the specification of lead agency reforms, investment strategies and safe system projects. World Bank Global Road Safety Facility.



- Brown, I. D., & Groeger, J. A. (1988). Risk perception and decision taking during the transition between novice and experienced driver status. *Ergonomics*, 31(4), 585-597.
- Bryman, A. (2016). *Social research methods*. Oxford university press.
- Burlacu, A., Burlacu, A. F., & Racanel, C. (2019, March). Road safety management in Romania. In 5th International Conference on Road and Rail Infrastructure. Challenges. Luxembourg: European Union.
- Chubukov, A. B., Kapitanov, V. T., Monina, O. Y., & Silyanov, V. V. (2014). Calculation of the Number of Fatalities in Road Accidents on the Basis of Socio-Economic Indicators. *Sci. and Technol. in the Road Sector*, 3.
- Dalvi, Q. (2004). World Report on Road Traffic Injury Prevention by World Health Organization and World Bank (WHO, Geneva, April). *Transport Reviews*, 24(3), 365-376.
- Davis, A., Quimby, A., Odero, W., Gururaj, G., & Hajar, M. (2003). Improving road safety by reducing impaired driving in developing countries: A scoping study. Transport Research Foundation Group of Companies.
- Douglas, M. J., Watkins, S. J., Gorman, D. R., & Higgins, M. (2011). Are cars the new tobacco?. *Journal of Public Health*, 33(2), 160-169.
- Dragutinovic, N., & Twisk, D. (2006). The effectiveness of road safety education. A literature review. Leidschendam: Swov Institute for Road Safety Research, The Netherlands.
- Eckermann, E. (2001). *World history of the automobile*. SAE.
- Elvik, R., Vaa, T., Høye, A., & Sørensen, M. (Eds.). (2009). *The handbook of road safety measures*. Emerald Group Publishing.
- Elvik, R., Høye, A., Vaa, T., & Sørensen, M. (2009). Driver Training and Regulation of Professional Drivers. In *The Handbook of Road Safety Measures*. Emerald Group Publishing Limited.
- European Transport Safety Council. (2018). 5th EU Road Safety Action Program 2020-2030. UN Economic Commission of Africa.
- EU Commission. (2015). *Road safety in the European Union: Trends, statistics and main challenges*. Internal working material EU DG Mobility and Transport.
- Evans, L. (2003). A new traffic safety vision for the United States. *American Journal of Public Health* 93 (9): 1384-6.
- Ghaffar, A., Hyder, A. A., & Masud, T. I. (2004). The burden of road traffic injuries in developing countries: the 1st national injury survey of Pakistan. *Public health*, 118(3), 211-217.

- Ghani, E., Nadeem, M., Bano, A., Irshad, S., & Zaidi, G. I. (2003). Road traffic accidents as a major contributor to neurosurgical mortality in adults. *Journal of the College of Physicians and Surgeons--Pakistan: JCPSP*, 13(3), 143-145.
- Ghee, C., Silcock, D., Astrop, A., & Jacobs, G. (1997). Socio-economic aspects of road accidents in developing countries. TRL REPORT 247.
- Gulzar, S., Yahya, F., Mir, Z., & Zafar, R. (2012). Provincial analysis of traffic accidents in Pakistan. *Academic Research International*, 3(3), 365.
- Hassan, M. N., Hawas, Y. E., & Maraqa, M. A. (2012). A holistic approach for assessing traffic safety in the United Arab Emirates. *Accident Analysis & Prevention*, 45, 554-564.
- Hyder, A. A., Ghaffar, A., & Masood, T. I. (2000). Motor vehicle crashes in Pakistan: the emerging epidemic. *Injury prevention*, 6(3), 199-202.
- Jacobs, G. D., & Baguley, C. J. (1995). Towards a strategy for improving road safety in developing countries. Overseas Centre Paper, (PA 3089/95).
- Jacobs, G. Aeron-Thomas, A. & Astrop, A. (2000). Estimating global road fatalities. TRL report 445.
- Jaroszweski, D., & McNamara, T. (2014). The influence of rainfall on road accidents in urban areas: A weather radar approach. *Travel behaviour and society*, 1(1), 15-21.
- Kazmi, S. Kamal Hayder. 2017. Alarming road accidents rate in Pakistan; rules and laws need overhaul. *Pakistan & Gulf Economist*.
- Kathmann, T., Ziegler, H., & Pozybill, M. (2016). Road safety screening on the move. *Transportation research procedia*, 14, 3322-3331.
- Klair, A. A. (2017). Road safety issues in Pakistan. Retrieved on April 23, 2020 from <https://nation.com.pk/12-Feb-2017/road-safety-issues-in-pakistan>
- Mahembe, B., & Samuel, O. M. (2016). Influence of personality and fatalistic belief on taxi driver behaviour. *South African Journal of Psychology*, 46(3), 415-426.
- Martha, C., & Griffet, J. (2007). Risk taking and risk perception in road safety: comparative study of young sportsmen and nonsportsmen in southeastern France. *Perceptual and motor skills*, 104(3\_suppl), 1243-1250.
- McKay, M. P. (2004). Traffic safety in the United States. *American journal of public health*, 94(2), 170-171
- Mohan, D., Tsimhoni, O., Sivak, M., & Flannagan, M. J. (2009). Road safety in India: challenges

- and opportunities. University of Michigan, Ann Arbor, Transportation Research Institute.
- Montella, A., Colantuoni, L., & Lamberti, R. (2008). Crash prediction models for rural motorways. *Transportation Research Record*, 2083(1), 180-189.
- Nadeem, M. S., Hussain, Z., Muddassar, M., & Nadeem, M. K. (2015). Socio-Causative Trends of Road Traffic Accidents in Pakistan. *Science International (Lahore)*, 27(4), 3837-3842.
- Nishiuchi, H. (2014). Traffic Safety Education and Awareness Activities in Japan. Technical Report. Nagaoka University of Technology. Nagaoka.
- Navin, F., Eng, P., Gallardo, G., Eanson Ho, M. B. A., & Villacorta, G. (2017). Road Safety in Peru. 22nd Canadian Multidisciplinary Road Safety Conference Banff, Alberta
- Peden, M., Scurfield, R., Sleet, D., Hyder, A. A., Mathers, C., Jarawan, E., ... & Jarawan, E. (2004). World report on road traffic injury prevention. World Health Organization.
- Ranganathan, B. A. (2016). Road safety and accident prevention in India. *Ratio*, 28(28.5), 28-5.
- Sethi, D., Racioppi, F., & Mitis, F. (2007). Youth and road safety in Europe. WHO EURO, Copenhagen/Rome. At.
- Shepherd, I. W., & Calvert, F. A. (1999). Australian road rules-what are they and where are they going. In *Road Safety Research, Policing, Education Conference*, 2nd, 1999, Canberra, ACT, Australia.
- Shoukrallah, R. (2008). Road safety in five leading countries. *Journal of the Australasian College of Road Safety*, 19(1), 9-12.
- Tyagi, P. & Shyam, R. (2018). Personality, Risk Taking and Road Safety Knowledge as Predictors of Road Safety Behaviour. *Scholars Journal of Arts, Humanities and Social Sciences* 10(2) 10-34.
- United Nations Economic Commission for Europe .(2008). Working Documents on road safety trends, statistics and challenges. UNECE.
- Vlakveld, W. P. (2004, November). New policy proposals for novice drivers in the Netherlands. In *Proc. Behavioural Research in Road Safety: Fourteenth Seminar* (pp. 194-204).
- WHO. (2020). The top 10 causes of death. Retrieved on January 21, 2021 from <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>
- WHO. (2017). Road Traffic Accidents. Afghanistan: WHO.
- WHO. (2017). Road Traffic Accidents. Bangladesh: WHO.

WHO. (2017). Road Traffic Accidents. China: WHO.

WHO. (2017). Road Traffic Accidents. Iran: WHO.

WHO. (2017). Road Traffic Accidents. United Arab Emirates: WHO.

WHO. (2015). Global status report on road safety 2015. World Health Organization.

WHO. (2013). Road safety in the WHO African region, the facts 2013. WHO P.1-13.

WHO. (2008). World Report on Road Traffic Injury Prevention World Health Organization.

Yannis, G., Dragomanovits, A., Laiou, A., Richter, T., Ruhl, S., La Torre, F., ... & Li, H. (2016). Use of accident prediction models in road safety management—an international inquiry. *Transportation research procedia*, 14, 4257-4266.

Zaman, M. (2019, July 5). Road Safety in Pakistan: A Serious Challenge to Public Health. *Daily Times*, Retrieved on March 24, 2020 from <https://dailytimes.com.pk/424048/road-safety-in-pakistan-a-serious-challenge-to-public-health/>

Zavareh, D. K., Bigdeli, M., Mohammadi, R., Khaneh, H. R., Laflamme, L., Bikmoradi, A., & Haglund, B. J. A. (2010). Road safety. *Injury prevention*, 16(Suppl 1), A53-A53.

Dinh-Zarr, T. B., Sleet, D. A., Shults, R. A., Zaza, S., Elder, R. W., Nichols, J. L., ... & Task Force on Community Preventive Services. (2001). Reviews of evidence regarding interventions to increase the use of safety belts. *American Journal of Preventive Medicine*, 21(4), 48-65.

Zia, Y., Sabir, M., & Saeed, I. U. (2014). Pedestrian injuries and fatalities by patterns in reported road traffic crashes-Islamabad. *J Pak Med Assoc*, 64(10), 1162-5.