

# Perception of Professional Drivers about Road Accidents in the Context of Roadway Hazards

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## Abstract

*Road accidents have a profound social impact on society by affecting the public property and victims' health, belongings and their social activities which lead to social isolation and poverty. Previous studies showed that road accidents were occurred usually by human errors, vehicle conditions, weather conditions, and road engineering, but roadway hazards not much emphasized. So, this study was aimed to quantify the roadway hazards which are responsible for road traffic accidents in the light of perception by professional drivers. For this purpose, the study was conducted in Multan, Pakistan through a cross-sectional survey using an interview schedule with a sample size of 336 drivers as respondents. The results of analysed data were showed that the professional drivers perceived that 38.7% inappropriate speed breakers and 18.5% of damaged roads always caused road traffic accidents, Moreover, drivers also perceived that road accidents had a social impact on victims, their families, and society. The crosstab and  $\chi^2$  test also demonstrated that there was a significant association between road traffic accidents and drivers' socio-demographic information. On behalf of the results, the study concluded that roadway hazards were responsible for road accidents especially inappropriate speed-breaker, and rigorous action is required to overcome these hazards.*

**Keywords:** Roadway hazards, Road accidents, Drivers, Social impact, Death

## Introduction

Roads are a source of mobility for individuals as well as goods to desired places. The transport schemes take individuals out of social isolation by mitigating their poverty for social stability. Roads play an integral role in meeting goals of national development, growth, and improving socio-economic functioning of the

nation, and roads are channels of maximizing economic and social benefits (Carmona, 2010). In most developing countries like Pakistan, one or two family members are responsible to earn money and the remaining other family members, totally, depend upon them. In case of any road traffic accident, the whole family has become upset due to injury or death of earning persons. Like other low-income countries even in Pakistan, roads carry several users from one location to another location like persons, heavy goods vehicles, public services vehicles, cars, bikes, and pedestrians, and most of the users comprise on youth because in low income and middle-income countries heavily depend economically upon young persons, so young persons have to go out from homes on roads for earning purpose, and thus they are more vulnerable of road traffic accidents (Kayani, King & Fleiter, 2011).

Road traffic accidents are known as sudden, unexpected and damaging events in which at least one vehicle is involved for hitting other vehicle or vehicles, debris, electric poles, pedestrian, damaged road, open sewerage holes, road barriers, and any other objects, occurring on a road which is opened to public use and it is caused the injury and death for at least one person. Intentional acts like murder, suicide and natural disasters are excluded (Gulzar et al., 2012).

Road accidents usually are become the causes of various types of injuries and even deaths each year over the world. Men, women, children going to work or school, playing in streets or setting out long trips never come back to homes, leaving behind blemished families. 2.4 million people died from road traffic accidents in a year over the world and 1.2 million people have died especially in low income to middle-income countries (Chen & Chen, 2011). There are several causes of road traffic accidents in developing countries like Pakistan e.g. pedestrian behavior, vehicle condition, weather condition, vehicle user 's state of health, rash riding/driving, carelessness and ignorance to traffic rules, untrained and underage riders/drivers (Hussain et al., 2014). and features of roadway hazards which can be as damaged road, open sewerage holes, inappropriate location of U-turns, inappropriate road divider cuts and open sewerage holes, road barriers by police, absence of traffic signs, broken trees and so on (Manan, 2014).

The features of roadway hazards are the common cause of road traffic accidents, and road traffic accidents affect the social and economic activities of individuals, as well as road safety, e.g. poor road's condition and road-related material hazards, are responsible for road traffic accidents, and road traffic accidents are causes the injury, disability, and death, and these impacts of road traffic accidents reduce the social functioning of an injured person, injured person's family and community, (Russo & Comi, 2012) one-third of total road traffic accidents of the whole world have occurred in low-income countries and road traffic accidents will be projected third major reason of global diseases in 2020 (World Health Organization, 2015). These lines support the current study that road traffic accidents occur sometimes due to a single cause and most of time due to more than one cause but the road-related cause is significant and affect the social routine (Herzberg, Mausner & Snyderman, 2011). During current years, road traffic accidents most important attention for many countries specially developing countries like Pakistan to improve road safety because

road traffic accidents constitute a great problem and impact on an injured person, his/her family, community and even designated society. There are roadway hazards impacts, firstly, the non-material impacts as the pain, the restlessness, suffer from anxiety, the reduced recreational activity of an injured person, the changing in behavior, loss of intangible side of health of an injured person and so on (Batool, Carsten & Jopson, 2012).

Secondly, there are direct and in-direct impacts as material impacts which are related road traffic accidents. The direct impacts of road traffic accidents are material damages (Morgan & Mannering, 2011) included damages of the vehicle, road infrastructure, electrical poles, buildings, impact on the cost of administrative services (police services, rescue services, emergency medical care services, transportation services), the impact on cost of medical facilities (hospital facility, emergency treatment and medicines, rehabilitation facility) and impact of traffic as traffic jammed which reduce the social mobility (Nasar, 2011). Another study of China on causes of road conditions responsible transportation accidents supported to this study that the roadway hazards were the causes of road traffic accidents, and further elaborated that injured persons of the transportation accidents are not able to be the part of economic activities and social functioning temporarily, and road conditions included damage roads, poor infrastructure of roads, slippery road conditions, absence of road signs, road encroachment, debris, fallen trees and open sewerage holes (Zhao, Wang & Qian, 2012).

During current years, road traffic accidents most important attention for many countries specially developing countries like Pakistan to improve road safety because road traffic accidents constitute a great problem and impact on victim, his/her family, community and even designated society. There are material and non-material impacts; firstly, the non-material impacts as the pain, the restlessness, suffer from anxiety, the reduced recreational activity of victim, changing in behaviour, loss of intangible side of health of victim and so on (Brijs, 2004). Secondly, there are direct and in-direct impacts as material impacts which are related road traffic accidents. The direct impacts of road traffic accidents are material damages (damage of vehicle, road infrastructure, electrical poles, buildings), impact on cost of administrative services (police services, rescue services, emergency medical care services, transportation services), impact on cost of medical facilities (hospital facility, emergency treatment and medicines, rehabilitation facility) and impact of traffic as traffic jammed which reduce the social mobility. In case of indirect social impacts of road traffic accidents are that the victim is not able to be the part of economic activities and social functioning temporarily if injured mildly to moderately but if victim faced severe disability or death then they are not able to socio-economic participation permanently as well as victim's family, relatives and friends are also affected socio-economically for a short or long time by road traffic accidents (Celus, Brijs, & Delcour, 2006).

## **Significance of the study**

The prosperity and development of nation rely on transport system to move individuals and goods from one place to another place, safe roadways and free from hazards refer to better transport system, and hazardous features both material and non-material of roads are high risks of road traffic accidents. Road traffic accidents are not only an individual phenomenon but also a social phenomenon. Road accidents have an impact on health, economic activities, social participation, self-dependency and behavior of affected persons, and increase the administrative cost as well. The roadway hazards have a significant role in reducing or increasing the rate of road traffic accidents and prosperity or deterioration of the social life of affected persons and their dependent family's members. So, the significance of the current study is that this study covers the roadway hazards which contribute to road traffic accidents.

## **Objectives of the study**

- This study was aimed
- To know the perception of professional drivers regarding roadway hazardous features which contribute to road traffic accidents
  - To analyse the dependency between road traffic accidents and socio-demographic status of professional drivers
  - To assess the perception of professional drivers regarding the social impact of road traffic accidents

## **Material and Method**

The study was conducted in Multan, Pakistan. This research was based on primary data, for the purpose of data collection; the cross-sectional survey was carried out through an interview schedule amongst professional drivers whose age was 18 years or above and was working as a public employee, private employee or self-employed with some inclusion and exclusion criteria. The target population was professional drivers who were operating cars, buses, trucks, vans, ambulances, long vehicle and tractor trolleys for earning to fulfil needs of daily living but drivers with an age of below 18 years, non-professional drivers (driving not for earning purpose), not working as drivers from last one year and drivers of metro bus service (metro bus service has separate roadway and well maintained, can't generalized with other roadways) were excluded for this study.

The representative units of the target population were selected from different geographical points including General Bus Stands, Parking of Shopping Malls, Hospitals, Hotels and Restaurants, and Stations of Punjab Emergency Service Department and Edhi Centres. The sample size of the current study was comprised of 336 professional drivers who responded to interview schedule which was consisted of three segmental parts including socio-demographic items, roadway hazards variables and variables for the social impact of road accidents. The items of the interview schedule were constructed through intense literature review and face validity of the

items were established by discussing them with two experts of road safety; one belonged to Punjab Emergency Service Department Rescue 1122 and the second belonged to City Traffic Police, Multan as well as two social researchers who belonged to Bahauddin Zakariya University, Multan. The interview schedule was revised according to their recommendations, and finally it was comprised of 29 items. There were 9 socio-demographic items: age, formal education, monthly income of respondent, license status, family members depending on the respondent, years of driving experiences, vehicle ownership and accidents in the last one year; 13 items were about roadway hazards: damage road, inappropriate speed breaker, open sewerage holes, congested road turn, sewerage/other water, the darkness of roadways, inappropriate divider's cuts, wrong U-tern, single road with double traffic, absence of road safety signs, encroachment, debris on roadway and absence of roadway fluorescent material; and 7 social impact items: general health, education activity, financial activities, social participation, the behaviour of effected persons, self-independence and societal functioning. The data was collected by getting prior informed consent and ensuring the confidentiality of respondents who participated voluntarily.

The collected data were analyzed through SPSS version 21 by conducting univariate and bivariate analysis. The bivariate analysis was also carried out among age, formal education, license status, length of driving experience, driving skills and the number of accidents faced in last year. The significance of bivariate analysis was drawn by conducting the chi-square test because not only the demographic data but also the data about the number of accidents faced in last year were collected at a categorical scale.

## Results

**Table 1:** Frequency and percentage distribution regarding drivers' socio-demographic data

<b>Variables and respective response categories</b>	<b>f</b>	<b>%</b>
<b>Age in years</b>		
18-33	156	46.4
34-49	116	34.5
50- above	64	19.0
<b>Formal Education</b>		
No	89	26.5
Primary	88	26.2
Secondary	76	22.6
Higher	83	24.7
<b>Monthly income of the respondent</b>		
20000≤	97	28.9
20001-40000	168	50.0
40001≥	71	21.1
<b>Family members depend on you</b>		

4≤	130	38.7
5-8	148	44.0
9≥	58	17.3
<b>Do you have a driving license</b>		
Yes	239	71.1
No	97	28.9
<b>Driving experience in years</b>		
1 year	132	39.3
2-4 year	89	26.5
5≥ year	115	34.2
<b>Do you drive your own vehicle</b>		
Yes	120	35.7
No	216	64.3
<b>Driving skills acquired by</b>		
Qualified instructor	73	21.7
Other informal ways	263	78.3
<b>Accidents in the last one year due to roadway hazards</b>		
NO	141	42.0
1-2	128	38.1
3≥	67	19.9

**Sources:** Cross-sectional survey

Data of table.1 illustrates the socio-demographic data of drivers comprising of 9 indicators. The data present age information that drivers aged 18 to 33 years were more with 46.4%, while drivers who fell between 33 to 49 and 50 and above years relatively less in percentage at the time of data collection. According to data drivers who gained no formal education were more with 26.5% as compared to drivers who gained primary, secondary or higher education. Table.4 also depicts the monthly income of drivers, the majority of drivers with 50.0% had the monthly income between 20001 and 40000 PKR. This study also demonstrated that 28.9% of professional drivers had no driving license which was alarming and 73.8% of drivers had gotten driving training by informal ways rather formal driving schools. Another alarming situation was that 38.1% drivers faced road traffic accidents due to roadway hazards which were a big percentage.

**Table 2:** Bivariate Analysis regarding the association between drivers’ socio-demographic information and road traffic accidents

Socio-demographic Variables	Numbers of accidents in last one year						Sig.
	No		1-2		3-More		
	F	%	F	%	F	%	
<b>Age</b>							0.000
18-33 Years	50	32.1	61	39.1	45	28.8	
34-49	66	56.9	37	31.9	13	11.2	
Above 49	25	39.1	30	46.9	9	14.1	

<b>Formal Education</b>							0.031
No	28	31.5	38	42.7	23	25.8	
Primary	33	37.5	36	40.9	19	21.6	
Matriculation	32	42.1	30	39.5	14	18.4	
Higher	48	57.8	24	28.9	11	13.3	
<b>Do you have a driving license</b>							0.000
Yes	139	58.2	80	33.5	20	8.4	
No	2	2.1	48	49.5	47	48.5	
<b>Driving experience in years</b>							0.000
1 year	32	24.2	56	42.4	44	33.3	
2-4 years	37	41.6	39	43.8	13	14.6	
5-More	72	62.6	33	28.7	10	8.7	
<b>Training of driving by</b>							0.044
Qualified Instructor	34	46.6	27	37.0	12	16.4	
Other (Informal ways)	107	40.7	101	38.4	55	20.9	

**Sources:** Cross-sectional survey

According to summarized data of Table.2, 11.2% of the professional drivers aged 34-49 years were faced 3 or more accidents in past one year as compared to drivers aged above 49 years and aged 18-33 years were faced 14.1% and 28.8% respectively. The numbers of accidents faced by professional drivers were differed by age groups,  $\chi^2(4, N = 336) = 24.20 \cdot p = .001$ .

Professional drivers who had no formal education faced more accidents 3 or more in last year with 25.8% as compared to higher educated drivers with 13.3%, and inversely, 31.5% of drivers with no formal education faced no accidents in last year whereas 57.8% of drivers with higher education faced no accident in last year. The value of qui-square also showed that the numbers of accident faced by professional drivers were differed by formal education they acquired,  $\chi^2(6, N = 336) = 13.91 \cdot p = .031$ .

Table.2 further shows that a majority of license holder drivers 58.2% don't have any single accident in the last year. Out of the total respondents who faced 3 or more accidents in the last year, only 8.4% were license holding drivers whereas 48.5% were without license holding drivers. The value of the chi-square also showed that the number of accidents faced by professional drivers was having dependent on the drivers' status of license holding,  $\chi^2(2, N = 336) = 111.98 \cdot p = .001$ .

62.6% of drivers with driving experience of 5 years or more faced no accidents in last year whereas 24.2% of drivers with experience of 1 year faced no accident in last year. These percentages illustrated that professional drivers who had more experience were at a low risk of road traffic accidents as compared to professional drivers who had less experience, and this dependency was also demonstrated by chi-square values,  $\chi^2(4, N = 336) = 46.08 \cdot p = .001$ .

Bivariate analysis showed, interestingly, that the drivers trained by either formal instructors of a formal driving institute or trained by other informal ways did not differ by road traffic accidents they faced,  $\chi^2(2, N = 336) = 1.80, p = .584$ .

**Table 3:** Frequency and percentage distribution regarding drivers' perception of roadway hazards into traffic accidents

Variables	Always		Frequently		Occasionally		Rarely		Never	
	F	%	f	%	F	%	F	%	f	%
Damaged road	62	18.5	196	58.4	55	16.3	14	4.2	9	2.6
Inappropriate speed breaker	130	38.7	135	40.2	41	12.1	19	5.7	11	3.3
Open sewerage hole	34	10.2	141	41.8	102	30.4	55	16.3	4	1.2
Narrow road turn	61	18.3	160	47.5	68	20.2	42	12.4	5	1.6
Sewerage and other water	25	7.3	122	36.2	154	46.1	25	7.3	10	3.1
Absence of street light	24	7.1	125	37.1	121	35.9	62	18.6	4	1.2
Inappropriate divider's cuts	26	7.6	131	39.0	110	32.9	48	14.3	21	6.2
U-turn at an inappropriate location	45	13.5	117	34.8	87	25.8	69	20.5	18	5.4
Single road but two way traffic	35	10.3	102	30.3	123	36.8	72	21.4	4	1.2
Absence of road signs	9	2.8	56	16.6	158	47.0	94	28.0	19	5.6
Road Encroachment	20	5.9	93	27.8	113	33.5	102	30.3	8	2.5
Road Debris	31	9.3	102	30.4	117	34.8	78	23.3	8	2.2
Absence of reflecting materials on roads	6	1.9	59	17.7	136	40.4	123	36.5	12	3.6

**Sources:** Cross-sectional survey

Table.3 shows the rating percentages regarding roadway hazards responsible for road traffic accidents collected by drivers' perception. According to drivers' perception regarding roadway hazards, there were 38.7% inappropriate speed breakers, 18.5% damaged road hazards and 18.3% narrow road turns which were always responsible for road traffic accidents. The drivers further said that the absence of light-reflecting materials on roads with 1.9 % also always become the cause of road



traffic accidents. The other frequent roadway hazards which become causes of road traffic accidents told by drivers were sewerage water on roads, absence or out of working street lights, inappropriate location of divider cuts, inappropriate location of U-turns, a single road for two-way traffic, absence of road signs (warning, informative, mandatory), encroachment, debris near or on-road, absent of light reflecting objects on road.

**Table 4:** Frequency and percentage distribution regarding drivers’ perception of the social impact of road accidents

Variables	To great extent		Somewhat		Very Little		Not at All	
	F	%	F	%	F	%	f	%
General Health	134	40	131	38.9	52	15.4	19	5.7
Education Activities	59	17.6	135	40.2	123	36.7	19	5.5
Economic Activities	206	61.3	97	28.9	21	6.3	12	3.5
Social Participation	67	19.9	160	47.5	69	20.6	40	12.0
Behaviour of Effecters	53	15.6	94	28.1	135	40.1	54	16.2
Self-Independency	55	16.5	116	34.6	103	30.6	62	18.3
Social Participation	99	29.8	112	33.2	77	22.8	48	14.2

**Sources:** Cross-sectional survey

Table.4 consists of the percentage distribution for the perception of drivers regarding social impacts of road traffic accidents. Table.3 showed that, according to the perception of professional drivers, road traffic accidents had 61.3% impact on economic activities, 40% on general health and 29.8 on social participation of affected persons and their families.

**Discussion**

There is a relationship between ages and road accidents, drivers with low age groups are more likely to road accidents due to their casual behaviours towards road safety and high age groups more tend to adopt road safety principles due to their more professional experiences (Mizenko et al., 2015). The way of acquiring driving skills is another factor that contributes to safety behavior about roadway hazards as the study showed that just 16.4 percent of professional drivers trained by formal instructors faced 3 or more accidents in the last year. The previous studies also illustrated that drivers training programs contribute to reduce road crashes and help to understand the hazardous material of roadway (Peck, 2011). The drivers with driving licenses are familiar with precautionary and informatory road signs which help the road user to avoid road hazards because license holders got this awareness for qualifying written and skill tests (Heesch & Ng, 2017).

Formal education of professional drivers is a significant indicator in assessing roadway hazards in the context of road accidents. The present study demonstrated

that drivers with high education had less likely to face any sole accident i.e. 57.8 percent of drivers had no single accident in the last one year whereas only 31.5 percent of professional driver without any formal education faced no road traffic accidents in the last year. An American study was conducted among professional drivers to gauge out socio-economic status as education, awareness about road safety and health index and this study had exhibited the significance of formal education in the context of road traffic accidents by using three education levels as less than high school (lowest), high school (middle) and more than high school (highest), and concluded that the drivers had low education level faced 3.5 times more deaths in case of road accidents as compared to drivers with highest education level (Elvik et al., 2007).

Speed breakers are the most effective way to control the over speed of vehicles on the roads to prevent road traffic accidents especially in developing countries (Afukaar, 2003) but inappropriate design or inappropriate location of speed breakers itself become the roadway hazard and ultimately the cause of road traffic accidents, and current study explicated that 19% inappropriate speed breakers were contributed in road traffic accidents out of other roadway hazards. Damage road was another frequent causative factor of road traffic accidents, this claim is supported by two studies that demonstrated that the pavement condition of roads may cause the road accidents in developing countries (Kuliczowska, 2016; Morgan & Mannering, 2011).

The road signs are also the most important causes to prevent road traffic accidents, usually, road traffic signs are categorized into three necessary divisions: regulatory, warning, and guiding signs and a study “safety impacts of signal-warning-flashers” also showed that road traffic flashers have been used to alert the drivers in reducing vehicle speed and guidance for preventing road traffic accidents (Wu et al., 2013). Open sewerage holes become the reason to trap the wheel of a vehicle or sudden shock which lead to damage the vehicle or and to hit with other vehicles or any object (Kuliczowska, 2016). The sewerage and other water influence the road traffic accidents, the similar facts showed another study that the sewerage holes’ condition of the subversive channel infrastructure, especially sewage systems, may add to road traffic failures like subsidence, spherical and mainly fall roads which become the cause of road accidents as well as rainwater also contributes in road crashes due to slippery road conditions (Keay & Simmonds, 2006).

Roadway hazards assessment is a general technique to identify the causative factors of road traffic accidents and ultimately to save lives. The current study identified some frequent roadway hazards such as narrow road turns, absence of street light, inappropriate divider’s cuts, U-turns at an inappropriate location, two-way traffic on a single road, road encroachment, road debris and absence of road signs (Zhou et al., 2004). The road traffic accidents constitute a social impact on the victim, his/her family, community and even designated society such as the reducing recreational activity of the victim, changes in behavior, loss of tangible and intangible side of health of the victim and so on (Brijs, 2004). The road traffic accidents damage the vehicles, road infrastructures, electrical poles, buildings, and impact on the cost of administrative services like police services, rescue services, emergency medical care

services, transportation services and also impact on the cost of medical facilities like hospital facilities, emergency treatment, medicines and rehabilitation facility, and impact on traffic as traffic-jammed and damage the roads which reduce the social mobility (Christie, 2001).

## **Recommendations**

This paper demonstrates that accident rates are still high and a lot of road accident causes are related to roadway hazards. There are many agencies that are responsible directly or indirectly for the reduction of roadway hazards to improve roadways. There is a need to improve the monitoring system and develop a network of coordination to report the hazardous feature of the roadway towards responsible agencies for removing these hazards immediately. For this purpose, a system of reporting can be established among the traffic police department, pre-hospital emergency care services, in-charges of community sectors and road construction related agencies under the supervision of the Deputy Commissioner (In Pakistan, a government officer who is responsible for coordinating all governmental departments and local administration on district level).

## **Conclusion**

This study examined the hazardous material and non-material features which were responsible for road traffic accidents, the relationship of road traffic accidents and socio-demographic status of drivers, and the social impact of road traffic accidents as well. Road traffic accidents are a universal phenomenon, occurred by road-related hazardous features such as inappropriate speed-breakers, damaged roads, without cover sewerage holes, lack of road signs, inappropriate location of U-turns and encroachment like other several factors such as weather conditions, poor maintenance of a vehicle, driver's behaviour, lack of awareness about road safety and so on. The impact of road traffic accidents is social in nature that affects the administration services, individual health, educational and economic activities and reduces the social functioning of individuals as well as society. There is also dependency between road traffic accidents and drivers' socio-demographic status. It can be concluded on the basis of the current study that road-related hazardous features especially inappropriate speed-breakers and damaged road has a great proportion in road traffic accidents in Pakistan and rigorous action should be taken to remove these road-related hazardous features.

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