

AN ASSESSMENT OF ROAD TRAFFIC AND ACCIDENTS ON THE MAJOR ROAD NETWORKS OF DESSIE CITY ADMINISTRATION

(A study on Dessie city, Amahara region, Ethiopia)

By

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Abstract: Road traffic injuries are the eighth leading cause of death for young people all over the world. More than million people die each year on the world roads. Risk of death and injuries are very high due to road accidents even in Africa. The aim of this study is to assess Road Traffic, Accidents and their causes in Dessie City, Amhara Region, Ethiopia. Furthermore, this study has examined causes and consequences of road traffic accidents in the study area. Mixed research approach is adopted to carry out the research. The data has collected both from primary and secondary sources. Primary data has collected from 139 respondents selected by using simple random technique and secondary data has collected from the available literatures, books, journals, magazines of the government and internet. Data analyzed both by qualitatively and quantitatively with the help of SPSS version 20. Findings revealed that, several factors have immensely contributed to the incidence of road traffic accidents (RTAs) in Dessie, such as human recklessness, vehicles defect, poor road design and poor traffic regulation enforcement. The study found the multifaceted effects of RTAs on the economy of households in particular and the country in general, on the social interaction of victims and family, as well as on the physical safety or the survival of individuals including permanent and temporal health problems.

Key Words: *Road Traffic, Accident, Pedestrians, Drivers, Traffic police, Dessie*

I. Introduction

Road accidents and injuries are affecting all sectors of the society throughout the globe due to less attention at regional and national levels. This results lack of information on the magnitude of problems and its preventability, fatalistic approach to road crashes, lack of political responsibility and multidisciplinary collaboration needed to tackle it effectively (Ferede, 2012). Cities in developing nations are not only showing rapid population growth, but also a transform in their citizen's way of life due to inadequate road networks, slow road construction and maintenance, growth of traffic, shortage of parking space, ineffective traffic management and enforcement, leads to road traffic accidents. This problem is common in most of the capital cities of African nations (Bitew, 2002) including Ethiopia. Country's economy is highly dependent on Agriculture with low level of urbanization and poor economic performance. One among various reasons for constraints in the economic performance is its transport sector facilitating different economic activities in the

national economy (Meron, 2007). In Ethiopia, the traffic has increased due to number of vehicles and conflicts between vehicles and pedestrians. Despite government efforts in the road development, road crashes remain critical problems of the road transport sector in Ethiopia (Berhanue, 2000). The country has experienced average annual road accidents of 8115 over the past 11 years (CSA, 2000- 2011) compared to over 8000 deaths annually in Turkey (Tesema, 2005). The rate of traffic accident death in 2007/08 was 95 per 10,000 motor vehicles which put the country on the extreme high side of the international road safety scene. Moreover, in the same year, the police report revealed 15,086 accidents which caused the losses of 2,161 lives and over 82 million Ethiopian birr, equivalent to US\$7.3 million estimated cost of property damage (US\$1 =11.34 Ethiopian Birr. There were 2.84 road accident fatalities per 100,000 populations in the same year (WHO, 2009).

II. STATEMENT OF THE PROBLEM

Many countries in Africa, including Ethiopia, have extremely high accident rates. The death rates per vehicle are 50 times that of European countries. "We urgently need to address this issue." In fact it has been predicted by the World Health Organization that unless the country takes urgent action road accidents will become one of the top causes of death within the developing world (Fanueal, 2006). In 2007-2008, a total of 15,082 accidents occurred in the country. Of them the number of people killed was 2,161 while 7,140 experienced non-fatal injuries. Amhara region accounted for 32.3% of the total road traffic accident-related deaths in Ethiopia during the year 2016-17. The rate of traffic accidents in Dessie goes up together with the increase of motor vehicles and population size. As a result of this alarming increase in car ownership together with the poor road conditions, South Wollo Zones recorded the highest absolute number of deaths in 2010 next to North Gondar, South Gondar and specifically Dessie city is now far from road safety and in traffic accidents ranked third next to Bahirdar and Gonder in ANRS (Dessie City Road Traffic Accidents Report, 2010). So, this study is scientifically assessed road traffic accidents, and is explored the causes of road traffic accidents that are occurring in Dessie city and try to fill the gaps by providing solutions to the problem.

III. OBJECTIVES OF THE STUDY

1. To identify the causes of road traffic accidents in the study area.
2. To assess the consequences of road traffic accidents on the social and economic activities of individuals
3. To examine measures taken to reduce road traffic accidents

IV. SCOPE OF THE STUDY

This research has tried to focus on the state of road traffic accidents, particularly, Dessie city administration. Under this study, road traffic accidents in the city has been assessed so as to know the extent of accidents in the city and to identify the major causes for road traffic accidents in the study area.

V. SIGNIFICANCE OF THE STUDY

The study is significant for different governmental, non-governmental and private sectors, policy makers, researchers, planners and other concerned bodies, road traffic safety, land use planning, cause road traffic accidents and related issues as an information and source for further study and address communities issues.

VI. LIMITATION OF THE STUDY

The study is limited to Dessie city traffic administration. There were so many problem faced by the researcher in order to collect the data. To do such kind of research, one obviously faces many problems beyond time and financial constraints. There is a scope of difference of opinions both by the institutions and concerned officers. Due to this problem, accident reports from annual reports lack significant level of consistency and accuracy and the figures obtained were not matched with the response given by the same officer who prepared the figure report. There was a problem of biased response.

VII. LITERATURE REVIEW

Segni (2007) have outlined that an accident is a rare, random, multi-factor event always preceded by a situation in which one or more road users have failed to cope with the road environment. Alister and Simon (2011) stated that accident involves personal injury occurring on the public highways including footways. Consequently, UN (2009), remains pessimistic in road traffic accident cases, it is projected that, road traffic injuries will be the

fifth leading cause of death globally by 2030. However, WHO (2004) projected, RTA crashes were ranked at 9th leading cause of burden of disease by 2002 could rank at the 3rd cause of burden of disease by 2020. Identifying the risk factors that contribute to road traffic crashes is important in identifying interventions that can reduce the risks associated with those factors (Lisa & David, 2005). For instance (WHO, 2009; WHO, 2010) reveals that, drunken driving is responsible for between 10% and 32 % of fatal crashes. In addition to this WHO (2004) have stated that Rates of seat-belt use vary greatly among different countries, depending upon the existence of laws mandating their fitting and use and the degree to which those laws are enforced. It is claimed by WHO (2004) that “Of the four main modes of travel, road travel scores by far the highest risk in most countries using almost any measure of exposure compared with rail, air and marine travel.” For instance a study reported at WHO (2004) shows that the higher the impact speed, the greater the likelihood of serious and fatal injury. The same report WHO (2004) proved that the higher the speed of a vehicle, the shorter the time a driver has to stop and escape a crash. To this end WHO (2009) summarized that, a 5% increase in average speed leads to an approximately 10% increase in crashes that cause injuries, and a 20% increase in fatal crashes. The age of drivers affects to the behavior of their driving styles and to the level of Driver’s attention. In similar sense (WHO 2004) Lisa, David et al. (2005) argued that Crash rates of male drivers aged 16–20 years were at least three times the estimated crash rate of male drivers aged 25 years and above. Regarding this WHO (2004); (WHO, 2009; WHO, 2010) dictates that Non-helmeted users of motorized two-wheelers are three times more likely to sustain head injuries in a crash compared to those wearing helmets. Wearing a motorcycle helmet correctly can reduce the risk of death by almost 40% and the risk of severe injury by over 70% (WHO, 2010). The use of mobile telephones while driving could result in unexpected RTA risks. WHO (2004) suspects that, the use of hand-held mobile telephones can adversely affect driver behavior as regards physical as well as perceptual and decision-making tasks. On the other hand, campaigns made to specific target group such as use of seat belt, drink-driving campaign and the like have led to a decrease in number of accidents in particular types during the campaign periods (Elvic & Runee, 2005).

Modifying each of the listed road factors are weather, lighting, roadside devices, activities, surface deposits, damage, deterioration and age (Lisa & David, 2005). Bridges are often located on sag vertical curves where approach traffic is on down grades and a factor responsible for increasing speed which contributes to the losing control of vehicles. Bridges are also more dangerous when located on bend road sections. The crash rates may be lowered by increasing lane and shoulder width or completely replacing bridges. Study made by Ung (2007) indicates that hazards associated with bridges can be substantial. Road constriction at narrow bridges diminishes the opportunity for safe recovery by out-of control vehicles and can result in end –of –bridge accidents. In the other way round the absence of road lights will add up to the RTA occurrences by 20 to 50% (Sandra, 2000). While vehicle design can have considerable influence on crash injuries, it must be studied in accordance to its contribution to RTA. Prior studies to this one like WHO (2004) have proved that vehicle related factors contribution to crashes, through vehicle defects, is generally around 3% in high-income countries, about 5% in Kenya and 3% in South Africa. Lisa, David et al. (2005) have argued that a small percentage of crashes are caused by mechanical failure of a vehicle, such as some form of tire failure, brake failure, or steering failure. Improvements have been made in the manufacture of tires and vehicle design however defects can still occur or be the product of poor vehicle maintenance. Similarly, Ung (2007) stated that Vehicles have caused road accident because their owners did not properly maintain and regularly inspect the vehicle during the maneuver. Supporting this idea (Lisa, David et al. 2005); Alister and Simon (2011) argued that, Weather on roads can contribute to crashes.

IX. ECONOMIC IMPACT

Naci and Chislom (2008) urges that, in economic terms, the cost of road crash injuries is estimated at roughly 1% of Gross National Product (GNP) in low-income countries, 1.5% in middle-income countries and 2% in high-income countries. In addition to this, in terms of regional disparities of cost of RTA Naci and Chislom (2008) indicated that, the economic cost of road crashes have been estimated to be as much as US\$ 24.5 Billion in Asia, US\$ 19 Billion in Latin America and Caribbean, US\$ 9.9 Billion in Central and East Europe, US\$ 7.4 Billion in the Middle East and US\$ 3.7 Billion in Africa. When we come to Ethiopia, RTA’s economic impact is even worse. As far as the economic impact of RTA in Ethiopia is concerned, Persson (2008) have discussed that, the economic impact of RTAs is substantial for Ethiopians as the annual cost is estimated to be around £40 million (Naci & Chislom, 2008).

IX. SOCIAL IMPACT

WHO (2004) claims that, over 50% of the global mortality due to road traffic injury occurs among young adults aged between 15 and 44 years and the rates for this age group are higher in low-income and middle-income countries. In 2002, males accounted for 73% of all road traffic deaths, with an overall rate almost three times that for females: 27.6 per 100, 000 population and 10.4 per 100, 000 population, correspondingly. Seemingly, WHO (2013) stipulates that, there are large disparities in road traffic death rates between regions. In an absolute similar manner Naci, Chislom et al. (2008) supports this argument by stating that, Road crashes kill and maim the most productive segments of the population. The report of WHO (2004) added that people with road traffic injuries accounted for 13-31% of all injury-related attendees and 48% of bed occupancy in surgical wards and were the most frequent users of operating theatres and intensive care units. WHO (2009) states that, over 90% of the world's fatalities on the roads occur in low and middle income countries, although these countries only have about 48% of the world's registered vehicles. The perspective of Rokytova (2000) black spots are defined as locations that are generally classified after an assessment of the level of risk and the likelihood of a crash occurring at a location. In another words, accident black spot on a National Highway in Norway is defined as any place with a maximum length of 100 meters, where at least four injury accidents have been testified to the police in a four year period (Elvic and Rune, 2005). Thus, a black spot in the UK may well have only five injury accidents in three years, whereas a city in Bangladesh may have black spot defined as having more than 10 injury accidents in a year (Geurts and Wets, 2003). In most developed states, black spots are defined as the locations where there are 12 accidents in 3 years per 0.3 kilometers (Guo, 2003). In Czech Republic, the black spot criterion is that junctions or 250m long road sections that are considered as black spots on condition that at least 3 road accidents with injuries occurred within 1 year or at least 3 road accidents with injuries of the same type occurred within 3 years or at least 5 road accidents of the same type occurred within 1 year (Rokytova, 2000). Elvic and Rune (2005) points out black spots on national highways in Norway have heavy traffic but do not have particularly high accident rates when compared with places which are not classified as accident black spots. Ranking of black-spots were done with various alternatives. Jonnessen and Sakshaug (2006) show three alternative methods of ranking black spots. These are number of accident with personal injury or serious personal injury, accident rates (accident per million vehicle kilometer) and potential for accident reduction. In addition to this, Lisa, David et al. (2005) stated that Black spot areas are sites that have had more than one fatal crash, sites with multiple crashes within a mile from one another.

X. RESEARCH METHODOLOGY

The total population of Dessie town is estimated at about 174,705. The sex composition shows that the male population constitutes 84,224(48.21) and the female counterpart is 90,481(51.79).

Male		Female		Total	
Number	%	Number	%	Number	%
84,224	48.21	90,481	51.79	174,705	100

(Source: CSA, Area, and Density by Region, Zone and Woreda, 2017)

The researcher used both qualitative and quantitative research approaches. The main reason to use qualitative approach is to describe and explain the theoretical aspects of road traffic accidents. Quantitative approach has used to understand the extent of road traffic accidents and causes of traffic accidents in numbers. Descriptive research type was used to describe road traffic accident, its causes and measures taken by the city administration so as to minimize accidents in the study area. For collection of data, simple random sampling technique has been employed. Researcher determines the sample size to address the research problems. For populations that are large, greater than 10,000, formula of Kothari (2004) will use.

$$n = \frac{z^2 \cdot p \cdot q}{e^2}$$

Where

n = size of sample

z = as per the table of area under normal curve for the given confidence level

p = Proportion of people expected to have the basic knowledge about the problem (occurrence of road traffic accidents in this case). So, this raw survey data enabled to take the p value as 10 per cent ($=0.1$).

$$q = 1 - p$$

e = acceptable error (the precision)

In case of unknown p , Kothari suggests to take it as 0.1 so that the sample size will be the maximum and the sample will yield at least the desired precision. In this research 95% confidence level and 5% of acceptable margin of error are used. Therefore; the sample size for the study is determined as follows:

$$n = \frac{(1.96)^2 \times 0.1 \times (1 - 0.1)}{(0.05)^2} \approx 138.29$$

Therefore, 139 pedestrians and drivers in Dessie city have been determined as the sample size, it includes 50% drivers and 50% pedestrians.

Besides, the researcher plans to conduct interview with 3 respondents from traffic police, so as to support the data that has found from pedestrians and drivers in questionnaire.

XI. SOURCE OF DATA

Primary data has been collected by using questionnaires, interview and filed observations. Primary data obtained from three different questionnaires, that have been distributed to all drivers and pedestrians who were near and willing to complete the questionnaires. In-depth interviews were conducted by using both open-ended and semi-structured format have been used to explore the views, feelings and perspectives of the sample respondents. Digital photo camera was employed to record the observations for further analysis and illustration of the results. The secondary data has been collected from different books, articles, Internet, publications, journals and other published and unpublished literature sources, from Dessie Traffic Police Traffic Accident Control and Inspection Office.

XII. DATA ANALYSIS AND INTERPRETATIONS

The analyses of the collected information from different sources were organized into their representative categories so as to come up with logical results. In dealing with the qualitative analysis based on the evidence collected from the different sources, an effort has been made to understand and interpret the information to use it together with the quantitative data. In the data collection process, informed consent of the respondents was sought and respondents were guaranteed anonymity and confidentiality by the researcher. All citations will be duly acknowledged and all participants will be treated respectfully.

XIII. DATA ANALYSIS AND INTERPRETATION

A. RESPONSE RATE

In undertaking the survey a total of 139 questionnaires were distributed for both pedestrians and drivers. Among the distributed questionnaires, 87.02% questionnaires have properly filled and returned from both pedestrians and drivers and the remaining 12.9% were not returned. The response rate of the study, as indicated in table 1 below, was 87.02%.

Table 1: Questionnaires Distributed, Returned and Unreturned

Category	Questionnaire	N	%
Respondents	Returned	121	87.02
	Unreturned	18	12.9
	Total Distributed	139	100.00

(Source: Own Survey, 2017)

B. PROFILE OF RESPONDENTS

Table-2 below showed that the number of respondents that had responded the questionnaire. There were total of 121 respondents from both pedestrians and drivers. As it is clearly shown in the table below, around 76% was

male and 24% were female. This indicates there was substantial representation from both sexes in this study and the number of male respondents was more than that of the female respondents. From table 2 it can also be deduced that large number of the respondents belong in the age group 21 to 35 and 36-50 which accounts for 43.8 and 45.5 % of the total respondent for each respectively. The next highest number of respondents was in the age group twenty and below which was 9.09 percent of the total respondents.

Table 2: Profile of the Respondents

VARIABLE		Frequency	Percent
GENDER	Male	92	76.0
	Female	29	24.0
	Total	121	100.0
AGE GROUP	< = 20	11	9.09
	21-35	53	43.8
	36-50	55	45.5
	51-65	2	1.65
	> 65	0	0
	Total	121	100.00
EDUCATIONAL LEVEL	Grade12 and below	51	42.2
	Diploma	36	29.8
	1 st degree	32	26.5
	Above 1 st degree	2	1.65
	Total	121	100.0

(Source: Own Survey, 2017)

Concerning educational qualification, as the table above indicates, the majority of the respondents are Grade12 and below, which is about 42.2 percent. The next larger numbers of respondents were Diploma holders, which was about 29.8 percent. The third largest numbers of respondents, about 26.5 percent, were 1st degree holders. There were two respondents who had master's degree.

C. YEARS OF STAY IN DESSIE

With regard to the table 3 below that summarizes number of years drivers and pedestrians were stayed in Dessie city, 6.6%, 23.1%, 43.0%, 19.8% and 7.4% of the current employee respondents served the organization for less than 1 year; 1 - 2 years, 2 - 5 years, 6 - 10 years and above 10 years respectively. As it can be seen, the majority of the respondents 43.0% of drivers and pedestrians were stayed in Dessie city for 3-5 years. Moreover, from the two respondents group selected by the researcher while majority (59.5) was pedestrians and the reaming 40.5% respondents were from drivers.

Table 3: Stay in the Organization

	Stay	Frequency	Percent
Stay in Dessie	Below a year	8	6.6
	1-2 Year	28	23.1
	3-5 years	52	43.0
	6-10 years	24	19.8
	Above 10	9	7.4
	Total	121	100.0
Occupation	Pedestrian	72	59.5
	Driver	49	40.5
	Total	121	100.0

(Source: own survey, 2017)

D. EXPERIENCE WITH REGARD TO TRAFFIC ACCIDENTS IN DESSIE

In addition to the secondary data source, the researcher distributed questionnaire to 121 Dessie dwellers/pedestrians and drivers to know the status of traffic accidents in the city. The responses obtained through questionnaire were presented together with the data obtained from Dessie traffic bureau.

Table 4: Traffic Accident Experience of Respondents

		Frequency	Percent
Traffic Accident Experience	Yes	114	94.2
	No	6	4.95
	Neutral	1	0.8
	Total	121	100.0
The Relationship of Accident and Number of Vehicles	Yes	40	33.1
	No	65	53.7
	Neutral	16	13.2
	Total	121	100.0

(Source: own survey, 2017)

As shown on the above table 4, the majority of respondents, 114(94.2%) told that there is high level of traffic accidents in Dessie, 6(4.95%) of them responded that they do not accept the high level of traffic accidents in Dessie, and the rest 0.8 percent of respondents are neutral. Concerning the second question (the relationship of accident and number of vehicles) in the above table 4 indicates the percentage share of responses of traffic police and pedestrians for the given questions. Both say that road traffic accidents do not occur due to the high number of vehicles moving on roads. Some 53.7% of drivers and pedestrians responded that accident is not predominantly caused by cars on street, but because of pedestrian's improper usage of roads and unlawful crossing of main roads, technical capacity of vehicles, low standard of road as well as other unknown factors.

E.KNOWLEDGE OF PEDESTRIANS ABOUT TRAFFIC LAWS IN DESSIE

During the survey pedestrians in Dessie city were asked about priority issues in the road to know whether they are given priorities to vehicles as required by law whenever crossing the road or not. And the response is depicted in table 5

Table 5: Pedestrian's responses on priority issue

		Frequency	Percent
Give priority to vehicles as required by law	Always	29	40.3
	Sometimes	25	34.7
	Never	11	15.3
	Neutral	7	9.7
	Total	72	100.0
Usually cross the main roads	At traffic light	0	0
	At junction	0	0
	At any point	27	37.5
	At zebra crossing	43	59.7
	Indifferent	2	2.8
	Total	72	100.0

(Source: own survey, 2017)

As shown on the above table 5, the majority of pedestrians 29(40.3%) respondents explained that they always give priorities to drivers, 25 (34.7%) sometimes give priorities to drivers and the rest 15.3% never give priorities. The researcher also tried to collect information about the above questions from different traffic polices and most of them said they have highly criticized pedestrian's behavior due course of putting traffic rules and laws in to effect at the time of using roads. According to traffic polices, some people start crossing roads even when car comes, haphazardly cross road, play on highways. To address this challenge, the Ethiopian government has launched new laws and rules regarding road usage. The new laws which will be implemented in the coming years incorporate conditions that allow law enforcement bodies to throw pedestrians in to jail and fine them accordingly. Accordingly, about 37.5% of the pedestrians lack knowledge about the signs, signals and symbols around the pedestrian crossings, the pedestrians do not know about their responsibilities as they

crossed the roads at any point. About 2.8% of them had doubts about where they crossing the main road and 59.7% of Dessie city dwellers use Zebra crossings when they cross main roads.

Pedestrians walking Habit in Dessie

Table 6: Pedestrians walking Habit in Dessie

		Frequency	Percent
Walk on the vehicles road	Always	4	5.6
	Sometimes	42	58.3
	Never	21	29.2
	Neutral	5	6.9
	Total	72	100.0
Walk with your face/back	Face to the oncoming vehicles	56	77.8
	Back to the oncoming vehicles	10	13.9
	Indifferent	6	8.3
	Total	72	100.0

(Source: own survey, 2017)

As learnt from the above table 6, in Dessie there are notable tendencies of pedestrians towards walking along vehicle roads. When asked to indicate how frequent do pedestrians have to leave the sidewalks and walk along roads, 4(5.6%) indicated that they always use vehicles road knowingly or unknowingly, 42(58.3%) indicated that they sometimes do this, while 21(29.2%) indicated that they never do this and they use the right pedestrians road except exceptional phenomena (road status, order from police or traffic police.) This habit of pedestrians to leave the sidewalks and walk along the roads increases the risk to accidents. Concerning the second question about 77.8% of the pedestrians use/walk the road correctly as the traffic rules and regulations ordered and 13.9% of pedestrians are not obey by traffic rules.

Table 7: Pedestrians view on traffic police commitment & Drivers priorities to pedestrians

Questions	Items	Frequency	Percent
Drivers priorities to pedestrians	Strongly agree	9	12.5
	Agree	13	18.05
	Neutral	6	8.3
	Disagree	30	41.7
	Strongly disagree	14	19.4
	Total	72	100
Commitment of traffic police towards their duties	Strongly agree	3	4.16
	Agree	15	20.8
	Neutral	20	27.8
	Disagree	27	37.5
	Strongly disagree	7	9.7
	Total	72	100

(Source: own survey, 2017)

As shown on the table 7 above, the majority of pedestrians believe that only 9(12.5%) drivers always give first priorities to pedestrians, 13(18.05%) sometimes give priority to pedestrians. However, the largest share which account for 30(41.7%) shows they do not give priority to pedestrians. In fact, this is a big problem in Dessie especially when pedestrians cross the main road. Moreover, the response of the pedestrians with respect to the above question, 27 (37.5%) indicated that large number of traffic polices are not committed to effectively discharge their responsibilities. The respondents replied that the commitments of the traffic police to their duties are poor. The combination of poor road traffic management, low level of infrastructures and low level commitments of traffic police to their duty aggravate the current road traffic accident in Dessie city Administration. Furthermore, respondents were asked to identify type of vehicles which is causing high number of road accidents in the city of Dessie and their response is presented in table below.

Table 8: Potential vehicles causing accidents

		No.	%
Potential vehicles causing accidents	Heavy vehicles(trucks, buses	18	36.7
	Light vehicles(cycles, Bajaj	23	46.9
	Medium vehicles(tax, automobiles	8	16.3
	Others	0	0
	Indifferent	0	0
	Total	49	100.0
Nature of collision	Motor vehicle with motor vehicle	31	63.3
	Motor vehicle with bicycle	1	2.04
	Motor vehicle with static object	6	12.25
	Motor vehicle with pedestrians	8	16.3
	Indifferent	3	6.1
	Total	49	100.0

(Source: own survey, 2017)

The above table indicates that 46.9% of the respondents argue that most of the accidents recorded in Dessie are mainly caused by caused by light vehicles (two wheels, three wheels) and others and 36.7% of the respondents argue that accidents recorded in Dessie are caused by heavy vehicles (trucks, buses and the rest 16.3 percent are caused by Medium vehicles (tax, automobiles. According to drivers' response, about 63.3% of the traffic collision or road accidents are between motor vehicles with motor vehicles which consist of high figure in Dessie. Motor vehicles with pedestrians have accounted for 16.3% and the rest 12.25% and 2.04% collision is between Motor vehicle with static object and Motor vehicle with bicycles respectively. The chart below shows potential vehicles causing accidents and nature of collision in the study area. More importantly, the research was asked attitudes of drivers and pedestrians towards annual Bolo inspection and enough traffic symbols, sign and traffic lights in relation to traffic accidents, and respondents' response is presented in table below.

Table 9: Attitudes of drivers and pedestrians towards annual Bolo inspection

		Frequency	Percent
The current Bolo inspection system is enough to control the city road accidents	Yes	17	14.05
	No	85	70.2
	Neutral	19	15.7
	Total	121	100.0
The city has enough road traffic signs, signals, symbols and lights in all important areas	Yes	5	4.1
	No	99	74.4
	Neutral	17	14.05
	Total	121	100.0
There is enough traffic police distribution throughout the city	Yes	41	33.9
	No	72	59.5
	Neutral	8	6.6
	Total	121	100.0

(Source: own survey, 2017)

Table 9 shows the response of pedestrians and drivers regarding annual Bolo inspection of vehicles taken by Dessie city road authority. Some 70.2% of respondents responded "no". According to them, the annual bolo inspection system is not done in attractive and enough way plus it is being taken annually. There is also unfair treatment and lack of modern technology used to inspect technical parts of the vehicles. Concerning the second question in the above box, the response of respondents regarding the availability of traffic signs, signals, symbols and lights throughout the city which are important for traffic flows, 74.4% of the respondents answered "No". This is also the researcher's observation as well as commander's responses (heads of Dessie traffic bureau) during interview. According to commander's responses the offices have launched a program to build different types of traffic signs, signals, symbols and lights throughout the city. Concerning the third question in the above box, about 59.5% of the Drivers and pedestrians do not accept the availability of enough traffic police distribution throughout the city. Currently, in Dessie there are 37 traffic police throughout the city. When we distribute these traffic police in 10 sub-cities, there is 3.6 traffic police or less average per day. This number is not enough to control the smooth flow of traffic.

Table 10: major locations of traffic accidents in Dessie

		Frequency	Percent
Roads of the city car accidents are the highest	On the main roads of the city	91	75.2
	On the residential roads	4	3.3
	On the peripheral area of the city	12	9.9
	Neutral	14	11.6
	Total	121	100.0

(Source: own survey, 2017)

Table 10 shows the major locations of traffic accidents in Dessie. Accordingly, the majority of respondents, 75.2% of the accidents occur in the main roads of the city. This is because of high number of vehicles involved in the transportation at a time (crowdedness), poor pedestrian's habit of road usage, etc. 9.9% of car accidents occur at the peripheral areas of the city and the rest 3.3% occur at the residential roads

CAUSES AND COLLISION TYPES OF CAR ACCIDENTS PRIMARY CAUSES REPORTED BY POLICE

Accidents commonly have multiple of causes as they stem from a myriads adverse circumstances. The Dessie traffic police are responsible for completing the traffic accident forms. An accident code contains thirty possible causes for accidents categorized under drivers, pedestrians, vehicles and road defects. From analyzing the accidents records of 2007- 2009 E.C, it was found that of all accidents, 74 percent were caused by drivers error, 6 percent happened as a result of pedestrians' error, 8 percent occurred as a result of vehicle defects, 3 percent occurred as a result of road condition and the rest 9 percent have been caused by other and unknown factors.

MAJOR CAUSES OF ROAD TRAFFIC ACCIDENTS REPORTED BY POLICE

There are a lot of causes that increase the road traffic accidents. Among the main causes of road traffic accidents, the most important ones as indicated by DTPR (2008) are

- ✚ Driving beyond speed limit.
- ✚ Negligent pedestrians crossing or walking on the wrong side of the road and rushing in to the road way.
- ✚ Mechanical defects of vehicles such as brakes, lights, etc....
- ✚ Violating traffic rules and regulation.
- ✚ Driving recklessly, dangerously or without due regard for other road users and lack of experience.
- ✚ Driving under the influence of alcohol or / and drug.
- ✚ Condition of road, (roads unsuitable for vehicles, such as narrow, low quality dangerous curves).
- ✚ Lack of keeping distance among other vehicles.

According to Dessie traffic police report (2007 - 2009), about 75% of the traffic accidents occur during the night time (08:00 to 19:00 hours interval) where the morning and till afternoon (08:00) the accidents rate is not too much. The researcher asked and tried to know the reasons for this question from Dessie traffic bureau and inspectors. The reasons that are mentioned by these participants are listed below;

- ✚ Drivers drive with taking alcohols
- ✚ High number of traffic flow
- ✚ Drivers have felt tired
- ✚ High number of pedestrians' movement.
- ✚ Pedestrians do not take too much care (drunkards, addictives)

Factors that Contribute to Road Traffic Accidents**Table 11: Road size and lack of parking accident intensity**

Size of the road and parking area are the cause for car accidents	Option	Frequency	Percent
	Yes	102	84.3
No	12	9.91	
Indifferent	7	5.8	
Total	121	100	
Traffic sign, signals and road marks to move on the street and cross the road	Yes	43	35.5
	No	56	46.3
	Indifferent	22	18.2
	Total	121	100
Road traffic management and licensing system causes road accident	Yes	103	85.1
	No	5	4.2
	Indifferent	13	10.7
	Total	121	100

(Source: own survey, 2017)

As shown in the above table above, the majority of respondents, 102(84.3 percent) of the respondents agree that the size of the road and lack of parking area in the city has caused car accidents. In Dessie, the size of the road is not too vast plus parking on the road is a common phenomenon. This in turn creates crowdedness of traffic flow and causes collision between vehicle with vehicles and vehicles with pedestrians. As presented in the table above, 35.5% of the respondents do correctly perceive traffic sign, signals and road marks when they move on the street and cross the road. However, 46.3% of the respondents are not correctly perceive traffic sign, signals and road marks when they move on the street and cross the road and the rest 18.2 percent of pedestrians and drivers kept silent. Regarding the second question, 85.1 percent of respondents state that the road traffic management and licensing system is the cause for road accident. Only 4.2 percent of respondents did not accept the above causes of accidents and the remaining pedestrians and drivers kept silent.

Table 12: Infrastructure (road condition) of Dessie city as a causes of Road accidents

The infrastructure (road condition) of the city causes Road accidents	Option	Frequency	Percent
		Yes	104
No	10	8.3	
Neutral	7	5.8	
Total	121	100.0	
Lack of traffic sign and behavior of pedestrians can be potential cause for road accident	Yes	101	83.5
	No	15	12.4
	Neutral	5	4.13
	Total	121	100.0

(Source: own survey, 2017)

As shown on the above table above, the majority of the drivers and pedestrians, 104(85.95 percent) of the total respondents believe that the infrastructure (road condition) of the city is the cause for road accidents, only 8.3 percents of respondents do not accept the above conclusion. For the second question, the majority of the surveyed drivers and pedestrians 101(83.5 percent) confirmed that the lack of traffic sign and behavior of pedestrians can be potential cause of road accident, 12.4 percent of pedestrians said lack of traffic sign and behavior of pedestrians alone cannot be a potential cause of road accident and the rest of 4.13 percent of pedestrians and drivers kept silent in this regard. Besides, respondents were asked to rank traffic accident causes, and their response is presented in table below.

Table 13: Dessie city traffic accident causes rank

		Frequency	Percent
Potential accident cause ranking	Drunk driving	22	18.18
	Not giving priority to pedestrians	22	18.18
	Not keeping right distance	7	5.78
	Incompetency of the driver	32	26.5
	Road status	5	4.13
	Over speed	29	24.0
	Neutral	4	3.30
	Total	121	100.0
Lack of traffic sign and behavior of pedestrians can be potential cause for road accident	Yes	101	83.5
	No	15	12.4
	Neutral	5	4.13
	Total	121	100.0

(Source: own survey, 2017)

As stated in the above box, some 32 (26.5 percent) of respondents replied that they agree incompetency of the driver is the major cause of car accident in Dessie, and 29(24 percent) of respondents agreed over speed is the second causes of car accident next to incompetency of the driver and last but not least 18.2 percent of drivers and pedestrians replied drunk driving and not giving priority to pedestrians is the third causes of car accidents. But the year 2007, 8 and 9 reports of Dessie traffic bureau show that ceding priority to pedestrians, ceding priority to vehicles and not keeping the right distance are the causes of car accident in that order.

CONSEQUENCES OF ROAD TRAFFIC ACCIDENTS

Accidents occur because of the interaction of many different factors (variables) among which are road, human factors, Vehicular, environmental factors and traffic characteristics. Each accident entails economic and social costs. It has also adverse impacts on the resources of the government which need hard decision taken on the resource that a country can devoted to road safety. From this, the researcher actualized that the major problems related to road traffic accidents are its impacts on the city and sub city dwellers and commuters, since individual mobility and the desire for travel increased that results in congestion and road traffic accidents. A traffic accident creates loss of life and property damages such as vehicle repair costs, human capital costs, economic and social loss are the major ones.

CONCLUSIONS

Dessie is characterized by poor traffic control systems and regulations, overcrowded residential patterns, lack of good engineering systems which can help reduce the high traffic congestion. Besides absence of road safety organization concerned with coordinating the different offices in relation with roads and road traffic, and absence of modern road transport regulations and other factors have resulted in a high number of traffic accidents in the city. According to Dessie traffic police reports and interview results, 75 percent of the total accidents in Dessie have been caused by human errors. Of these accidents caused by human errors, drivers were also indicated as responsible for about 74 percent of the cases. Failure to give way for pedestrians, over speed and not moving at right distance were also the main reported and observed errors of drivers. The behavior of pedestrians is also causing loss of life and huge material damage. People in the city give little attention to traffic because of little experience and knowledge of a comprehensive traffic regulation and lack of awareness about how to safety act in the motor traffic system. In conclusion, the mixed traffic flow in narrow and heavily pedestrians movements, mismanagement urban of public transport provision, poor standard of vehicle (most of vehicles are old), poor maintenance and development of roads, the negligence of drivers due to lack of adequately training and driver testing, negligence of pedestrians due to lack of stringent laws, poor traffic control and enforcement which combine increase risk of accidents on roads of Dessie. Low institutional and public awareness of the extent of an immense destruction of traffic accidents aggravates the situation.

RECOMMENDATIONS

Discussions with pedestrians, drivers, traffic police and children about their level of knowledge of the rules and laws of road safety revealed that the majority of these road users did not have education and training. Therefore, road safety education should be given to all sections of the community. All dwellers should be trained to be good road users at all stages of their lives. The training and education system should also start at home among family members. A strong commitment is needed towards road safety education in schools. According to traffic police reports almost all accidents have driver's error as one of the contributory factors. And there should be viable means in due course of improving the standards of driving. The driving training program of motor vehicles should also be introduced coupled with revised test and safety emphasis. Updated training and education is needed for beginners as well as licensed drivers. Media campaigns should concentrate on disseminating knowledge to the public regarding the safe use of the roads, as well as ways to change unsafe traffic attitudes. Since the pedestrians are the main victims of the accidents, intervention should be given by the responsive body. Hence, from this it is suggested that for a concerned body:

- ✚ Speed limits need to be stipulated in policy especially at locations where there are many pedestrians at risk. I.e. at shopping and school
- ✚ Sidewalks for pedestrians should be clearly identified and fenced.
- ✚ Avoid roadside vendors and shops.
- ✚ Zebra crossing for pedestrians.
- ✚ Educate pedestrians using grass root communication system about rules and regulation of traffic.
- ✚ In order to improve data management, there is a need to computerize the system.
- ✚ Particularly Dessie city administration needs to develop our staff in transport planning, controlling and engineering
- ✚ Improving Road Safety and licenses awarding system as the issue of road safety is vital by its virtue it needs a special treatment in order to save the lives of citizens. To this effect the government must pay due attention.
- ✚ Introducing penalty system is crucial to make those who violate the rules come to the right track as per the traffic management system.
- ✚ Traffic sign, symbols and signals and others related concept of traffic rules should be given to society in different formats, education curriculum, exercise books etc.

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