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A DISASTER RISK ANALYSIS: A CRITICAL REVIEW OF TRAFFIC ACCIDENTS IN ETHIOPIA

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Abstract: Economic growth and population size has stimulated the high demand for transportation in Ethiopia. Since road transport is the dominant mode of transportation system, the afore-cited couple of factors impose pressure in increasing gross vehicle fleet ownership that were reported to be 935,888 in 2018. The Country still has low motorization rate compared with many African countries. As an external effect of the road transport system, Traffic accident in Ethiopia has become a high ranking disaster risk that has resulted with a total accidents of 28,364 in 2018, causing injuries, deaths and property damages amounting ETB 109,882,371.00. In a great stride to tackle the problem, Ethiopia has announced national policy and strategy on disaster risk management carrying a vision to significantly reduce the damages caused by disaster risk by 2023. Sadly, the current situation of road crash accident is rising with time. In taking a pragmatic step to curb the ever-growing injury, fatalities and property damage, policy makers should engage community, business and religious leaders to take a robust action on prevention, mitigation and preparedness. Similarly, in post-crash care, conditions for first responders as pre-hospital care should improve the underequipped facilities and obtain the political support together with involvement of local communities.

Index Terms **- Traffic accident, disaster, hazard, post-crash**

1. BACKGROUND

Hazard is a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation (Abbasov, 2018). These hazard may turn in to disaster where no preparedness actions are taken against them. To classify an event as disaster, there are conventional standards that needs be satisfied. Accordingly, an event is called a disaster if it has registered a loss of 10 or more people, 100 or more people are affected, when there is an official state of emergency declared because of the event and when an official call for an international aid is made by the victim country. The traffic police report indicate that Ethiopia's road traffic accident meets criteria number one and two that spontaneously classifies its road accidents as disaster risk.

The Global status report on road safety reveals that the number of annual road traffic deaths reached 1.35 Million in 2016 (WHO, 2018). If no action is taken on road traffic safety, the problem is predicted to result in the deaths of around 1.9 Million people annually by 2020 (WHO, 2013) . Remarkably, it is the leading killer of people aged from 5-29 years old while pedestrians, cyclist and motor cyclists are the prime victims in developing countries (WHO, 2018).

According to the 2015 global status report on road safety, African regions has the highest road fatality rate i.e. 26.6% per 100,000 population relative to global rate of 17.5% per 100,000 population for the year 2013 (Debela, 2019). While the region owns only 2 % of world vehicles, Africa carries imbalanced death rate, relative to the level of motorization. Road accidents in Africa also cause about 5% of loss of GDP. The report again added that although low and middle income countries account for 47 % of world's registered vehicles, over 85 % of all deaths and 90 % of road traffic deaths occur in these developing countries.

In Ethiopia road transportation is the dominant mode of transportation system that the demand can be initiated from the following two factors. First economic growth: Ethiopia is one of the fastest economically growing country in East Africa registering 7.7 percent growth in 2018 (NBE, 2018). The report stresses that, this robust and sustained economic growth recorded over the last 15 (Fifteen) consecutive years have led to improvements in income inequality and poverty reduction. The stated economic growth has reflected on the expansion of road transport mode. And in 2018 the achieved road density per 1000 square Km increased from 109.2 Km to 115.2 Km a year ago, depicting a 5.5 percent improvement over the previous year (NBE, 2018). Second, The report released by (World Bank, 2018) describes that Ethiopia will remain challenged by its fast growing population which is projected to reach 106,983,000 in 2022 in high fertility assumptions, and attain 118,957,000 in 2027 (CSA, 2013), Increase in population size drives the need for more transportation demand that is coupled with the need for balanced infrastructure expansion. In line with the above fact, the urban population that needs transportation facility and partly categorized as pedestrians is also expected to increase by 22.8%, 25.4% and 28.2% in 2022, 2027 and 2032 FY respectively (CSA, 2013). This will exert pressure on transportation facilities plus it triggers vulnerability to road accidents, in favor of this (WHO, 2004) has supported with the report showing that pedestrians may account up to 75% of the total Road traffic accidents.

Increase in vehicular mobility has a direct consequence of increasing road traffic accident. According to the police report in 2018, In Ethiopia the total road traffic accident were 28,364, having a trend of persistent increment over the previous years. To this effect, world health ranking (WHO, 2004) has quoted that, road traffic accident in middle income countries has existed on the sixth deadliest factor.

The reviewed annual police report indicates that less educated drivers have committed less traffic accidents than educated drivers. According to the study carried out by (Newnam, et al., 2014), younger and less educated drivers are found in safer driving mode than older and more educated drivers. Furthermore, the study conducted in Addis Ababa between 2003 and 2009 FY elaborated that, pre-owned vehicle fleet have contributed to the majority of Road traffic accident. Vehicles used for more than five years involved the 75.24% of accidents where 3.74% of accidents were involved in cars used for one year or less (Akloweg, et al., 2011).

In assisting RTA victims, researches show that in Ethiopia health facilities are under equipped. In view of this, (Sultan, et al., 2015) has expressed his view that, in Addis Ababa ambulance transport time was twice as long compared to international recommendations of less than eight minutes emergent transports. In tackling the problem, there are various intervention stages in deterring the effect of RTA.

As part of the disaster risk management system, Prevention is an act of lessening the likelihood of a disaster (RTA) from the start through promotion, training and engineering measures. However, if the disaster is unpreventable and leads to loss of life or property damage a mitigation step will be taken to lessen the effect. The study conducted by (Tsegaye, et al., 2010) in Addis Ababa considering sample size of 2,985, the majority 81.4% of victims didn't receive post-crash care at any level either pre-hospital or hospital. In post disaster approaches, since the rate of physical injury and fatality before reaching a hospital in low and middle income countries is over twice that in high income countries (WHO, 2018), the first responders and health facilities should be well equipped to discharge their responsibilities adequately and timely in collaboration with the involvement of local communities.

In an effort to mitigate the ever-growing problem, (WHO, 2018) the global community, in its Sustainable Development Goal 3, targets to halve the number of global deaths and injuries from road traffic accidents by 2020,"

2. METHODOLOGY

The Secondary data used for this re-analysis purpose is obtained from the Federal Police commission office which covers a period of Eight (8) consecutive years. For any traffic accidents occurred out of Addis Ababa, the respective regional offices are responsible to record, compile and submit the final result to the Federal police commission office to draw a national report. The assimilated secondary crash data comprises of the following focus points:-Accident with respect to age and sex, educational level, terrain type, vehicle service years, road type, pavement condition and type, weather condition, severity of causality and vehicle population data in regional basis. In the course of this reanalysis process, population census data was adopted from Ethiopian Statistical Agency (CSA) 2013. The aim of this article review has a paramount importance in pinpointing the contribution of each critical traffic accident exposure factors in combating the increasing disaster risk problem in our country.

3. RESULTS

3.1. OVERVIEW OF LEGAL FRAMEWORKS

3.1.1. NATIONAL LEGAL FRAMEWORK ON DISASTER RISK MANAGEMENT

Ethiopia has launched national policy on disaster prevention and management in 1993 (FDRE, 2013). The policy has a vision to significantly reduce the damages caused by disaster risk by 2023 and set an objective of establishing a comprehensive and coordinated disaster risk management system in the context of sustainable development.

To develop resiliency, save lives during disaster, protect livelihoods and ensure all disaster affected population are provided with recovery and rehabilitation assistance. It gives a direction to introduce a comprehensive disaster risk management plan in to development plans and programs of government institutions and private sector, so that damages caused by disaster can be reduced by implementing necessary response intervention systems before, during and after the circumstances, with a shared responsibility of concerned actors through a down structured management system. This has been done through well-organized information management and communication system. Subsequently a relevant early warning of the case is beneficial to assign resources and provide the necessary counter measure to save lives and livelihoods. Following policy coherence, International cooperation shall strengthened on the sector. Disaster risk management give special emphasis to women, children, elderly people with disability and people living with HIV/ AIDS of the community.

3.1.2. INTERNATIONAL LEGAL FRAMEWORK ON DISASTER RISK MANAGEMENT

In an attempt to reduce natural disasters and increase awareness on the importance of risk reduction particularly in developing countries, the UN General assembly on 11 December 1987 declared the 1990's to be the "International Decade for Natural Disaster Reduction" (IDNDR). Through the UN resolution 44/236 on 22 December 1989 the General assembly forwarded goals that they want to meet during the decade and duties of the UN agencies for the purpose (Coppola, 2015).

In May 1994, UN member states met at the world conference on natural disaster reduction in Yokohama, Japan to assess the progress attained by the IDNDR. At the conference, they developed Yokohama Frame work of strategy and plan of action for a safer world. The framework give emphasis to developing countries, in particular the least developed, landlocked countries and the small island developing countries.

In 2005, the world conference was held to develop the Hyogo framework for action (HFA) to serve from 2005-2015 aiming to build resilient nations and communities. The General assembly has accepted the outlines under the UN Resolution 60/195. HFA was the first plan to explain the detail tasks required from different sectors and actors to reduce disaster losses.

Eventually, the currently working Sendai frame work was endorsed by the UN resolution 66/199 to reduce the disaster risk from 2015 – 2030. The framework recognizes that the state has the primary role to reduce disaster risk but the responsibility should be shared with other stakeholders including local governments and private sector.

3.1.3. NATIONAL TRANSPORT POLICY REVIEW

The national policy and strategy on disaster risk management assigned Ministry of Transport as lead sector agency with respect to transport service related hazards. However, Ethiopia does not have integrated national transport policy, excepting Addis Ababa city that have an independent transport policy. To overcome the current varied challenges of the sector, Ethiopia requires to develop an integrated national transport policy to address traffic accident that comprises Road Transport, Maritime, Railway and Air transport to set a common goals and use common approaches.

When Addis Ababa City Administration transport policy was launched on August 2011, a serious emphasis was given to reduce traffic accidents occurring in the city. The entire urban population is relentlessly increasing from time to time where it has same feature to Addis Ababa. Due to a projected urban population increment (CSA, 2013), the associated transport demand combined with the number of vehicle fleet are rising from time to time.

Thus, Clause 3.4 of Addis Ababa City Transport policy promotes to jointly participate all stake holders to prevent a traffic accidents. It proposes to improve database systems to easily identify accident prone /Black spot/ locations in a coordinated manner. The policy has an intention to expand educational safety awareness, and to follow drivers' professional ethics and vehicle technical fitness to mitigate vivid traffic accidents in the capital city.

3.2. OVERVIEW OF TRAFFIC ACCIDENT IN ETHIOPIA

Despite the global community target that rely upon the sustainable development Goal 3, to halve the number of deaths and injuries from road traffic accidents by 2020, the number of annual road traffic deaths reached 1.35 Million in 2016 (WHO, 2018). Again the Global Status report on road safety released by (WHO, 2013) states that "If no action is taken on road traffic safety, the problem is predicted to result in the deaths of around 1.9 Million people annually by 2020".

As the road traffic accident has become a major global public health threat. Middle income countries have also challenged with the continuously increasing problem and remained the sixth deadliest factor as per world health organization update (WHO, 2004). In Ethiopia the police report entails that 28,364 road traffic accidents were recorded in 2018. Consequently, 1074 accidents were light physical injury, 1903 severe injury, 459 fatal. Likewise, the study carried out by (Debela, 2019) shows that, Despite low motorization rate in Africa, the region lose 5% of its GDP due to road traffic accident. Similarly, Ethiopia was subjected to a property loss of ETB 109,882,371 in 2018. Figure 1 shown below describes the total accident trend in Ethiopia.

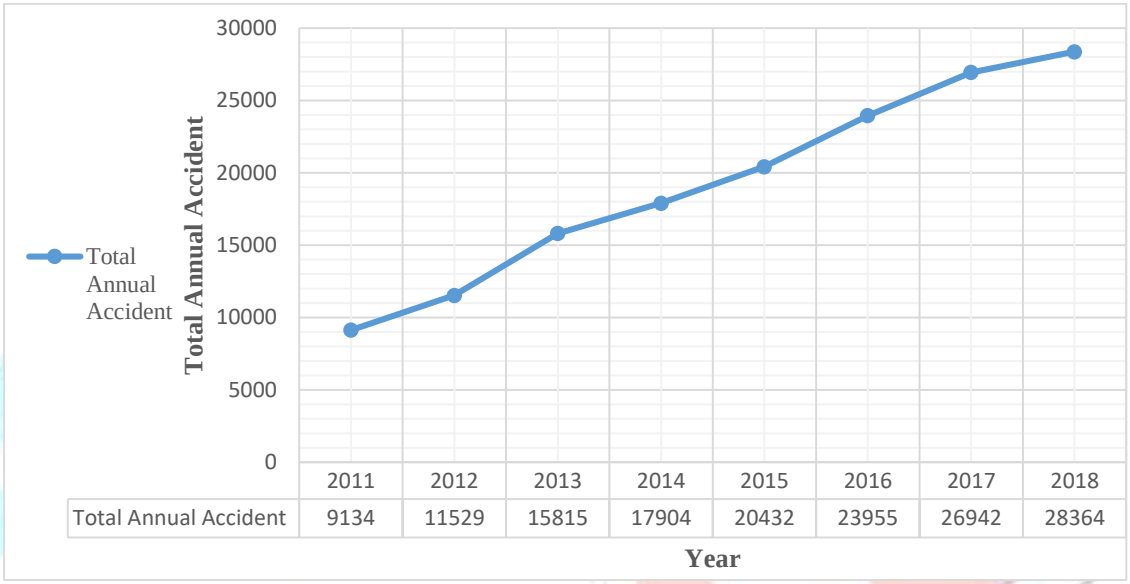

Figure 1: Total Accident Trend in Ethiopia
Source: Ethiopian police commission Bureau (Computed by authors)

3.3. TREND OF NATIONAL VEHICLE FLEET

The economic and population growth has a tendency to rise the transportation demand together with the total number of vehicle fleets operating in the country and attain a total of 935,888 vehicle fleets in 2018. In addition, Ethiopia is the second most populous country in Africa. By the year 2017 the total population size was estimated to be 104.96 Million, and by 2030 the projected total population size will be expected to reach 139.62 Million having annual growth rate of 2 % (CSA, 2013). To satisfy the entire transportation demand, the total number of vehicle fleets operating in the country have increased as shown on Figure No.2.

In view of global standards, Addis Ababa as a capital city exhibited low motorization rates. The report released by (World Bank, 2016) describes that, the motorization rate was 130 vehicles per 1000 people with a total registered vehicle fleet of 426,500 in 2015. However, in 2018 Addis Ababa hosts 553,938 (59.2%) of vehicle fleets which is higher than regional records since the economic activities spatial arrangement give leverage to attract intense vehicular movements. The trend of national vehicle fleet growth is shown on Fig. 2.

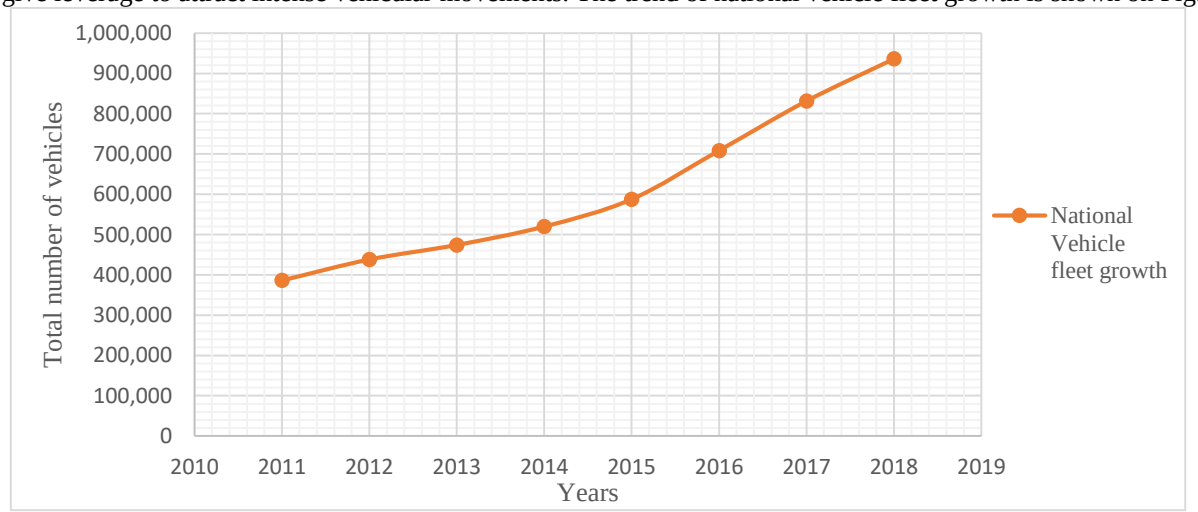

Figure 2: Trend of vehicle fleet growth in Ethiopia
Source: Ethiopian police commission Bureau (Computed by authors)

The vehicle fleet ownership distribution across regions vary depending upon several factors, the entire vehicle fleet distribution across regions are presented on the graph shown below:

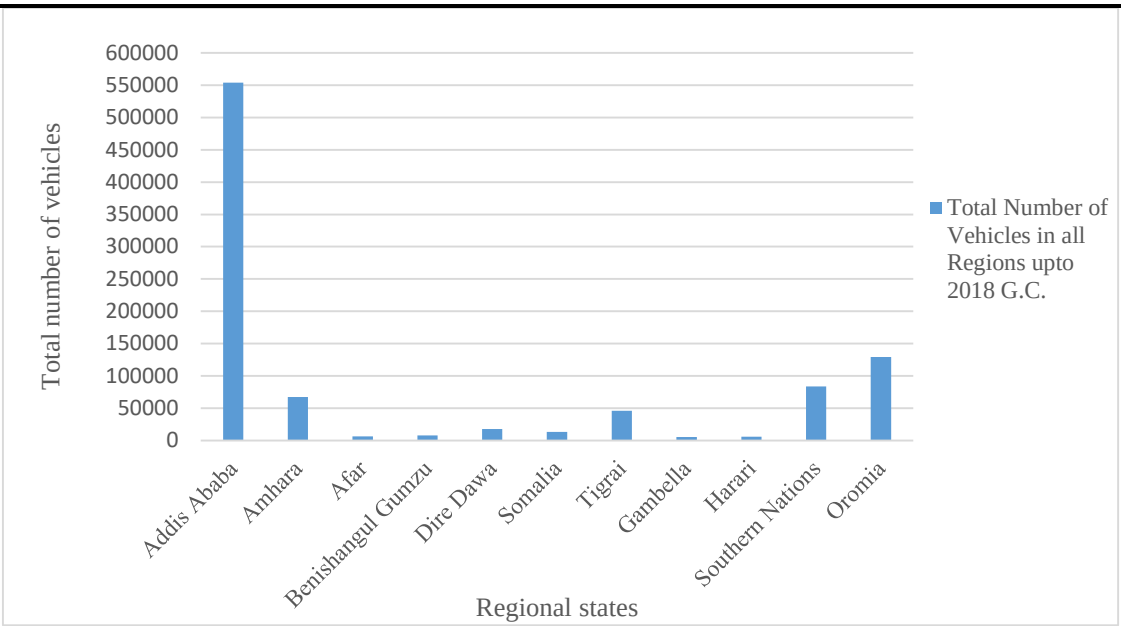

Figure 1: Total number of vehicle fleets distribution across Regions
Source: Ethiopian police commission Bureau (Computed by authors)

3.4. DETERMINANT'S OF TRAFFIC ACCIDENT

3.4.1. TRAFFIC ACCIDENT BY SEX

Despite all the efforts by the stake holders, traffic accident has kept killing indiscriminately. Since the problem is rising through time, still it remained one of the threat to our citizens that demand urgent intervention. As part of determinant factor of the problem, in 2018 out of 28,364 accidents 24,100 accidents were happened on male while 3,835 accidents were on Female. Long time records also show that the accidents committed by women are minimal relative to males. The Pie chart shown below presents the comparative analysis on traffic accident by sex.

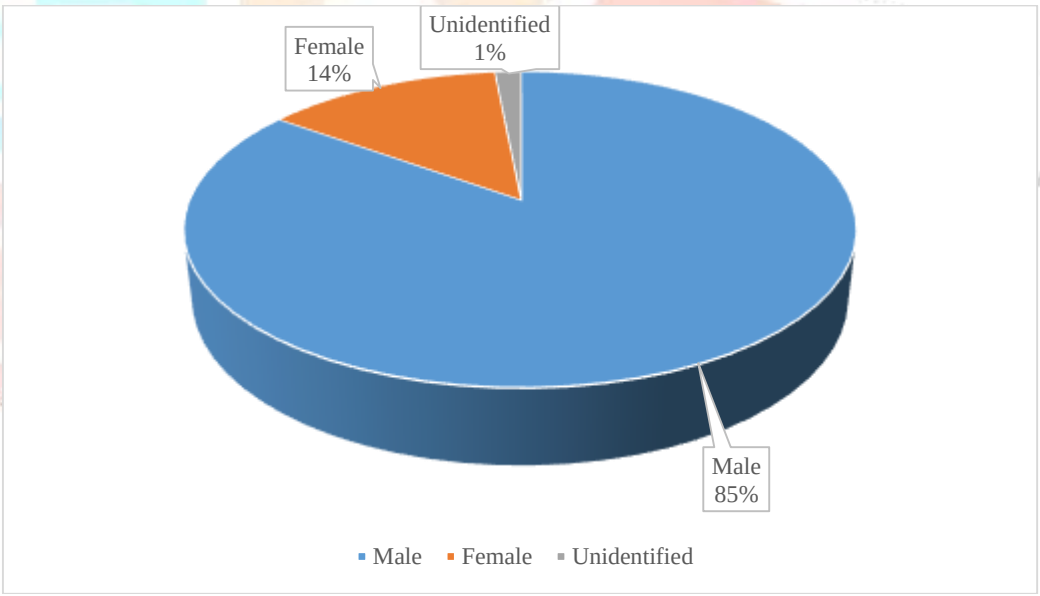

Figure 4: Total Road Traffic accident by sex
Source: Ethiopian police commission Bureau (Computed by authors)

According to the police report, in 2018 Males are main victims that took 85% of accidents in the reporting year, while women share 14% of the total. In 2004 according (WHO, 2004) report among 58.8 Million deaths occurred globally, 27.7 Million were females while 31.1 Million were males. In addition, the study carried out by (Abegaz & Gebremedhin, 2018) shows that, Two third (2/3) i.e. 65% of victims are male and 35% are Females. The report released by (Baru, et al., 2019) reveals that the majority of road accident victims are male and apprehending a ratio of around 76.6% male and 23.4% female. Likewise, in South Africa, Men were killed by Road Traffic accident three fold more than women, notably percentage of victims were 77% Male and 23% Female. In Ghana it was reported that 35% of all injury related to fatal, where 41% of the fatality is with pedestrians and victims of rear end collisions. With regard to gender, it is entirely shown that males were 6 six times more likely to die than females. Nevertheless, females were more likely to die as pedestrians (90% of all female causality deaths) and males were also more likely to die as riders or drivers (Damsere-Derry, et al., 2017). There are various assumptions for the occurrence of accident based on sex: (World Bank, 2007) justified that the difference in journey patterns between male and Female will change their exposure to risk involvement in road accidents. In an effort to overcome the above challenges, the data shows several works including technical training and any awareness creation should target males in order to significantly reduce accidents.

3.4.2. TRAFFIC ACCIDENT OCCURRENCE BASED ON HOURLY BASIS AND WEEK DAYS

Traffic flow varies in all week days. On Monday, Traffic flow is heavier on roads within town section than any other week days since it is the first day after weekend. While Tuesday to Friday the traffic flow is nearly similar. However, traffic flow decreases on Saturday and Sunday usually since many people stay at certain place. To this reason, Road Traffic accident on Monday is maximum. Furthermore, there is a relative increment on Tuesday and Thursday of the week days as the reason was predicted by research that, because of carelessness, and uncontrollable behavior of individuals which result from difficulties in working environment could be the case (Sonmez, 2000).

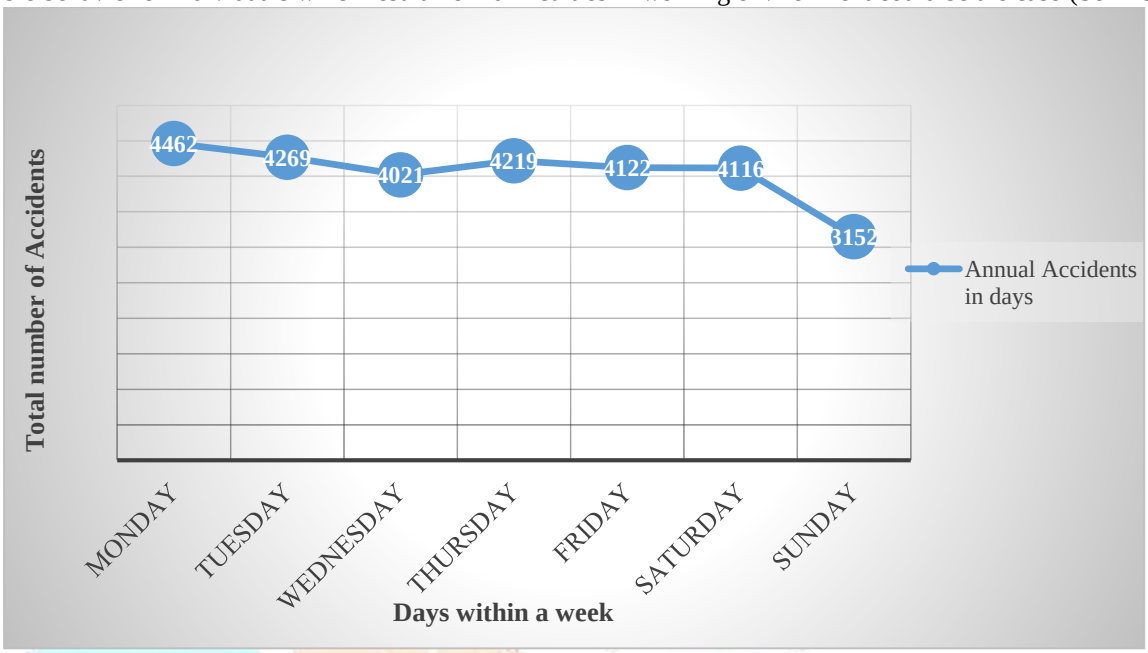

Figure 5: Total Annual number of accidents in days of the Week
Source: Ethiopian police commission Bureau (Computed by authors)

In the same fashion, traffic accident in relation to time is shown on Fig. 6, According to the police annual report, Traffic flow varies in relation to the time of day. Starting from 0100-0500 in the morning the rate of traffic accident was minimal. The rate was at maximum level in midday from 0700-1400, after 1700 it starts to continuously decrease up to morning 0100. The frequency of an accident varies due to different aspects. (Mandiracioglu, 1993) Argues that a person who has more workload and responsibility is more likely to engage in accidents due to personal behavior and factors such as tiredness, lack of concentration, lack of attention, risk taking, aggressiveness, and lack of self-control.

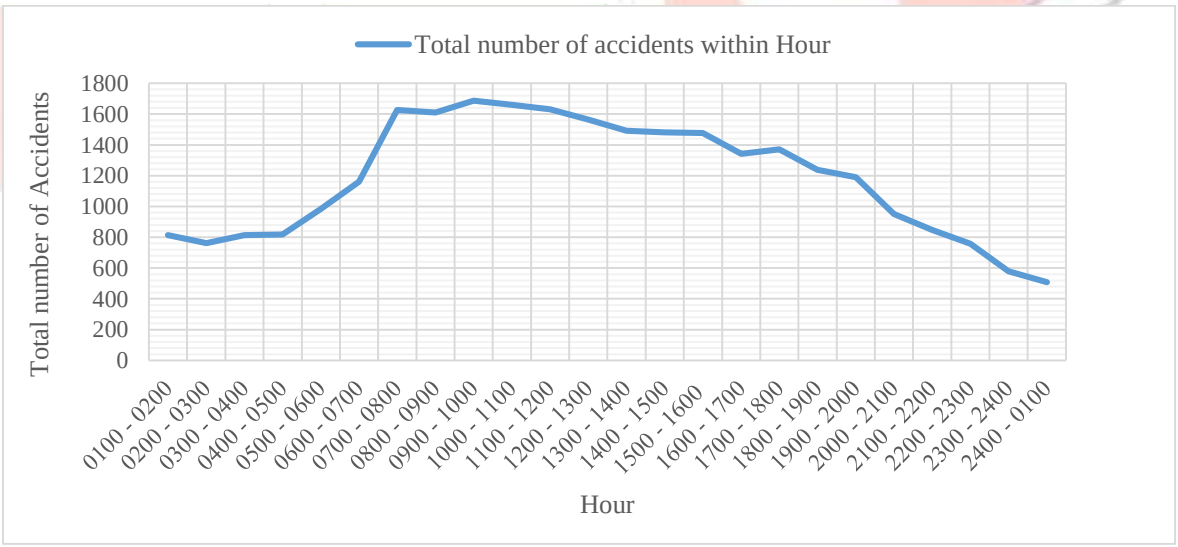

Figure 2: Total number of accidents 24 Hour time split
Source: Ethiopian police commission Bureau (Computed by authors)

3.4.3. TRAFFIC ACCIDENT BY AGE GROUP AND EDUCATIONAL LEVEL

The study conducted by (Newnam, et al., 2014) in Addis Ababa explored differences in driving behavior across age and educational background of taxi drivers in Addis Ababa. Accordingly, the study describes that younger and less educated drivers were engaged in more safe driving behavior than older and more educated drivers. In line with the traffic police report 2018, Drivers with age group from 31 to 50 years old accounted for the highest accident rate i.e. 41%. While age group of 18 to 30 follow with 40% accident rate. Drivers with age more than 51 years were accounted for only 16% of accidents contrary to younger drivers. Thus, in effort of minimizing the traffic accidents, Male drivers whose age group from 18- 50 shall be the focus group for awareness creation purpose and other strategic interventions.

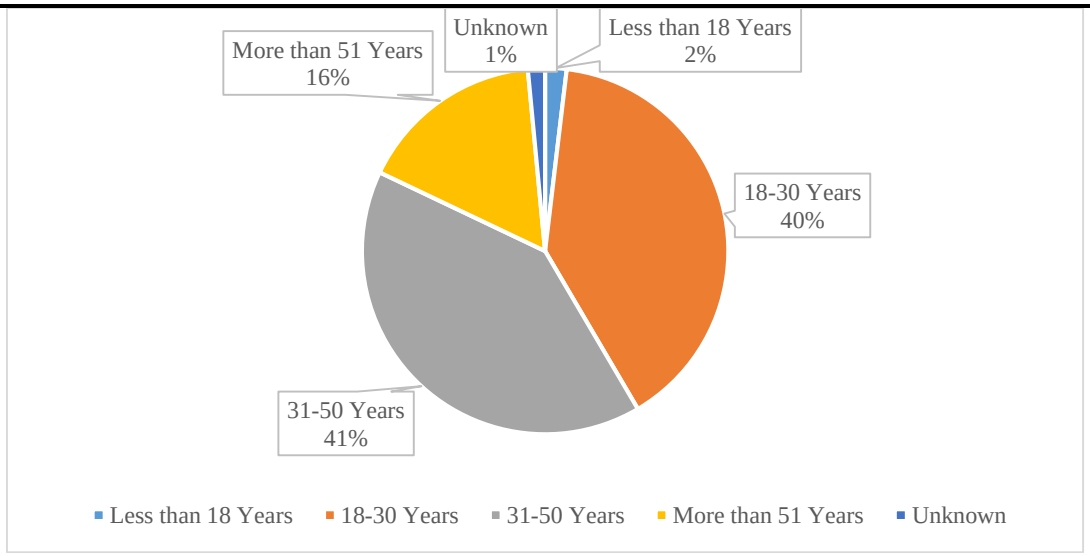

Figure 3: Age of drivers that commit accident
Source: Ethiopian police commission Bureau (Computed by authors)

Again (Newnam, et al., 2014) has added that, drivers with less years of educational level reported in engaging in lower rule violations, inattention and tiredness while driving compared with drivers who attended more years of education. Similarly, the traffic police report in 2018 reveal that, Higher accident were committed by drivers whose educational back-ground is more than secondary high school than lower level drivers. This implies that people with better educational profile and understanding couldn't bring behavioral change in driving. Thus, here is the question, would the usual awareness creation trend works? If not, what should be done to reverse the situation?

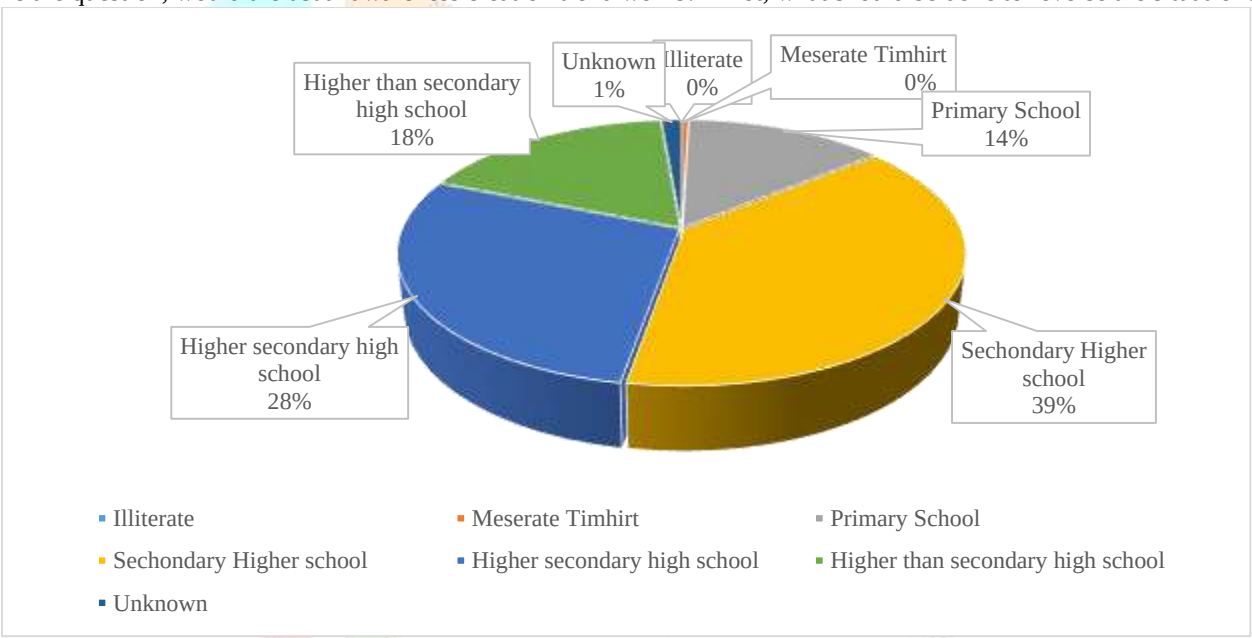

Figure 4: Road Traffic Accident by drivers' Educational level
Source: Ethiopian police commission Bureau (Computed by authors)

3.4.4. ACCIDENT BY VEHICLE SERVICE YEAR

Besides the driver's mistakes, vehicle's technical fitness and service age will play pivotal role in accident contribution. Certain African countries like Egypt, South Africa, Sudan and Morocco have banned importation of used vehicles, whereas Kenyan Bureau of standards banned importation of second hand vehicles older than seven years. Other countries like Uganda restricts vehicle older than 15 years whereas Tanzania has set limit in 10 years. In India in 2017, it is evidenced that old vehicles caused accidents due to frequent malfunction. Among the total accidents of 104,355 the number of accidents happened involving vehicles older than 10 years is 42, 939. In Ethiopia's circumstances vehicle from 2-5 service years involve the highest accident following from 5-10 years would commit an accident. Despite the aforesaid fact, in Ethiopia there is no service year restriction in importing vehicle. And the minimum tax was imposed on used vehicles while it was reverse for the new imported vehicles. Vehicle service year and accident exposure rate is shown on Fig.9 below.

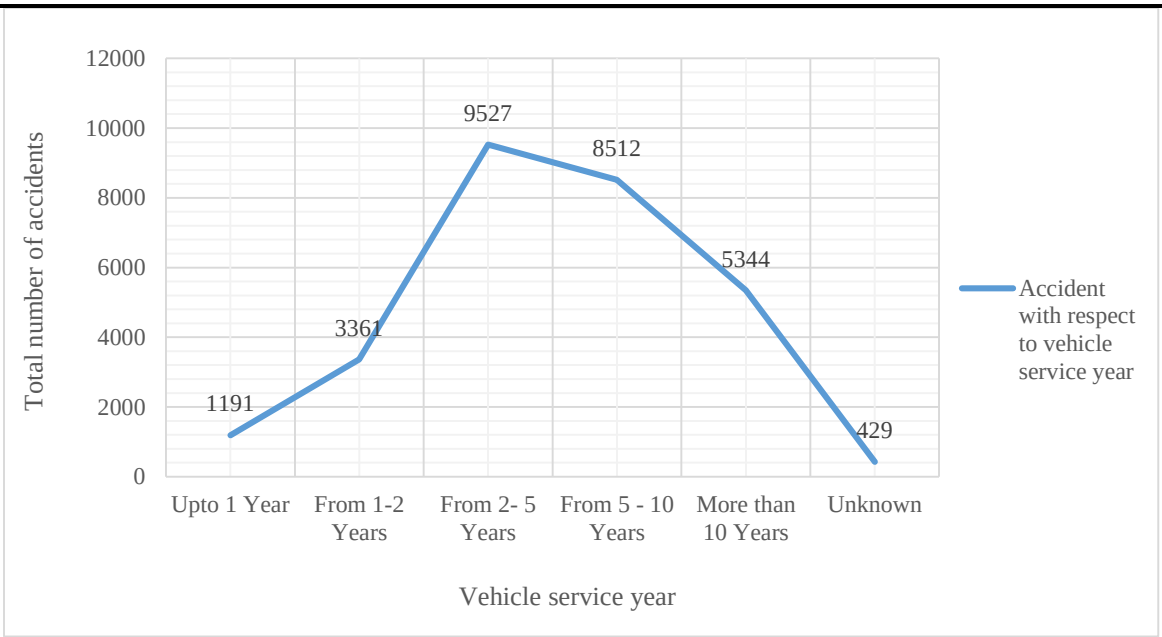

Figure 5: The relationship between accident and vehicle service year
Source: Ethiopian police commission Bureau (Computed by authors)

3.4.5. CERTAIN CHARACTERISTICS OF ROAD TRAFFIC ACCIDENT

Alcohol related traffic accident is estimated to share 5-35% of all road deaths (WHO, 2018). Again (Baru, et al., 2019) has reported that drivers who drove under influence of alcohol were 2.64 times more likely to cause severe injury to themselves or to others. Accordingly the police report in 2018 shows Hundred Fifty (150) drivers in the country were committed an accident under the influence of Alcohol and Fifty Three (53) by taking drugs. Table No. shows some factors triggering road traffic accident and respective accident record in 2018.

Table 1: Certain Characteristics of road traffic accident in 2018 (Source: Ethiopian police commission Bureau)

	Factors	Recorded accidents in 2018				Total Accidents
		Fatal	Severe physical injury	Light physical injury	Property damage	
1	Alcohol	3	22	8	120	150
2	Drug	-	2	1	50	53
3	Fail to prioritize pedestrian	139	1342	741	149	2232
4	Inappropriate overtaking	16	7	10	1577	1594
5	Light jumping	-	27	6	193	226
6	Jumping stop sign	-	-	-	162	162
7	Inappropriate parking	-	1	-	414	415
8	Driver fatigue	-	-	-	7	7
9	overloading	-	-	1	158	159
10	Break failure	-	-	2	127	129
11	Tire flattening	-	-	-	10	10
12	Road defect	-	-	-	29	29

3.5. TRAFFIC ACCIDENT AS A DISASTER RISK

3.5.1. INTRODUCTION

It is known that traffic accident is the major global health problem. In a joint effort of reducing both pre-disaster and post disaster trauma, the national and sub-national disaster risk management has to function with the involvement of local communities in all the disaster risk phases/ stages.

3.5.2. MODERN DISASTER RISK MANAGEMENT APPROACHES

In a great stride of reducing disaster associated with road traffic accident in our country, a robust institutional capacity required to lessen the burden. DRM has a wide scope that embraces activities designed to control over disaster to the situation of helping at risk person to avoid or recover from impact. In practice, although the steps are sometimes intermixed, it has the following clear approaches to address the road traffic accident problem.

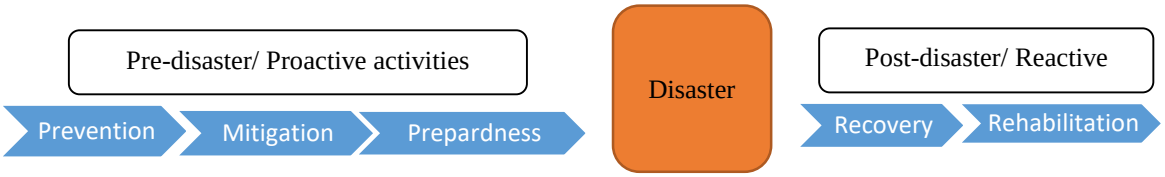

Figure 6: Disaster Risk Approaches

3.6. PRE-DISASTER /PROACTIVE ACTIVITIES

3.6.1. PREVENTION, MITIGATION, AND PREPAREDNESS MEASURES

3.6.2. PREVENTION WAYS

A) IMPROVE DRIVER LICENSING TECHNIQUES

The survey carried out by (UN, 2009), explains that 8% of the victims of road users were drivers. While it was suggested that approximately 86 % of the crashes are attributed to driver error (Newnam, et al., 2014). Likewise the police report in 2018 explains that 413 (Four Hundred Thirteen) drivers were victims of the accident. So drivers should never only be physically, psychologically and technically fit enough to operate. But they have to be sensible in abiding the driving discipline and have to acquaint with ethical values. Furthermore, there should be a system for new licensed drivers to operate under supervision for certain periods until they smoothly negotiate with the actual driving scenario of the city.

B) GIVING PRIORITY TO THROUGH VEHICLES AND RESTRICT OTHER USERS

Around junction and side crossing road, priority has to be given to through vehicles. Except zebra crossing, Pedestrians and animals have to be restricted. The police report show that, due to lack of providing priority to through vehicles 6054 accidents occurred in 2018.

C) FASTENING SEAT BELT

As per the report (WHO, 2018), wearing seat belt reduces the risk of death among drivers and front seat occupants by 45-50%. However, the secondary data obtained from our source don't have number of accidents caused by lack of use of seat belt.

D) PROVIDE EQUIVALENT ATTENTION WITH OTHER HAZARDS

According to the world health organization rankings (WHO, 2004), in 2018 Road traffic accident in the middle income countries is cited on the sixth rank among the top causes of death. There should be robust promotion system in drawing attention like any other killer diseases that people give due attention to safeguard the lives of our citizen.

E) SAFETY AUDIT

The experience of road design in our country rely on ERA Design Manuals which comprises: Geometric design manual, Flexible pavement design manuals, Hydraulic and Hydrology Manuals, Bridge Design manual, Technical Specifications etc. Basically the entire manuals are directly adopted from the USA, AASHTO design manual that are prepared incongruence with their own climate and site condition, On the top of this, these design standards are known to fully consider safety aspects. But, we are not certain, to what degree these design parameters have internally captured the safety factors for accident prone locations. Hence, It is imperative to assign safety Engineer participating during design, construction and operational stage.

The following key parameters that comply with the standards have to ensure traffic safety:

F) ROAD ALIGNMENT: HORIZONTAL AND VERTICAL ALIGNMENT

- **SIGHT DISTANCE**

Road cross-sectional elements: A safe road should have sufficient number of lane and lane width to accommodate the design traffic volume. Furthermore, road side features and side slopes are important during veering towards the road side where the driver is able to regain control of the vehicle on the shoulder and safely return to travel lanes and a design should have a sufficient width of shoulder to park a broken vehicle out of the travel lane to avoid traffic accident. At last, a design should consider road furniture's and safety guards as a complement of safe design.

- **SPEED RESTRICTION**

Ethiopian Roads Authority design manual reveal the allowed vehicle speed limit which varies for different topographic features and road functional classification. However, In 2018. out of the Total 28,361 accidents 2,670 accidents were committed due to the over speed driving. High speed driving will minimize the perception reaction time of the driver (The time s/he observed an object and act to hold a break). The graph shown below shows the probability of death associated with the impact speed.

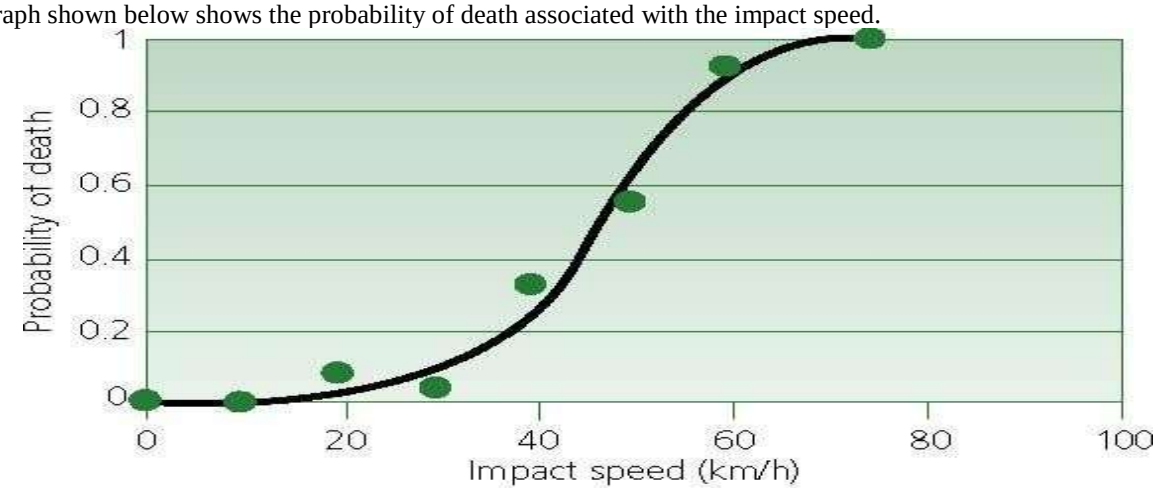

Figure 7: Impact speed and Probability of death relation: Source *(WHO, 2009)*

In view of the above fact, speed rate has a direct relationship with impact rate that immediately leads to fatal accident or severe physical injury. Currently the traffic police have been implementing a spontaneous speed limit control on certain locations using Gun Radar. Nonetheless, still very significant numbers of drivers were caught to violate the restriction in jeopardizing the safety of life and property. Beside to the routine awareness creation task, police officers should deploy additional speed controlling instruments to take very stringent measures in order to improve the driving behavior since it was supported by the study lead by (Baru, et al., 2019) stating that, injuries occurring in environments with tight traffic police control were 51% less likely to be severe than those occurring in locations without tight traffic police.

G) EFFICIENT LAND USE POLICY

Developments of urban settings with easily accessible services and amenities can reduce the vulnerability of road users.

3.7. MITIGATION

There are some factors that might be overlooked in the prevention stage of usual work process leading to an accident. So, Mitigation is a necessary step taken in advance of a recognizable circumstance to minimize or avert the likelihood of a known threat. This step is very crucial in lessening the destructive effect of an event. It may undergo through the process of providing Policy, Providing Training, creating Public awareness and so on. In a much summarized way this phase may comprise the following tasks:

- Improve quality of drivers technical training and provide promotional and educational training for pedestrians
- Provide a serious emphasis for the quality of draft and final design quality to meet all safety parameters.
- Provide a speed limit appropriate to the terrain types; curves should be provided with appropriate super elevation slope to accommodate the centrifugal force effect.
- The design should comprise all necessary road furniture's like lane markings, traffic signs and guard rails.
- Consider appropriate transition road length to smoothly negotiate with the curve.
- Provide sufficient sight distance and continuous clearance is mandatory by the time trees and bushes were grown to obstruct the driver's sight.
- During pavement design and construction emphasis has to be given to improve skid resistance on the wearing coarse layer of the pavement.
- Provide speed calming structures on a certain selected sites to alert drivers.

3.8. PREPAREDNESS

It is a prior coordinated measure taken to predict traffic accident, respond to incidents and manage by the time it happened. Preparedness can extend to the three phases i.e. before, during and after the incidence.

The preparedness stage helps us to assess or evaluate the appropriateness of measures to be taken during the course of the action. Moreover, beside to aligning the available resource and manpower, it helps to device a compatible measure of defense to minimize the magnitude of impact.

The phase can also include Early warning systems that employ with the dissemination of early and timely information to a likelihood traffic accident which helps to minimize the impact or possibly avert the threat.

3.9. POST DISASTER /POST CRASH CARE/

3.9.1. RECOVERY AND REHABILITATION

The stage includes all methods taken by the traffic accident affected community to fully recuperate from the incidence to its pre-disaster condition and level of functioning. According to (WHO, 2018) the proportion of injured people who die before reaching a hospital in low and middle income countries is over twice that in high income countries. Similarly the study carried out by (Getachew, et al., 2016) at Zewditu Memorial Hospital, among the total 779 Patients, 8% were RTI cases (65 Cases per month on average). The study reveal that only 29% of cases received pre-hospital care either in an ambulance or at another health facility, 14 % arrived at hospital by ambulance. This implies that policy makers should work on reinforcing post-crash care facilities with resources comparable with the growing incidence.

3.9.2. POST-CRASH CARE

The post-crash care step helps to limit the extent of injury and suffering that comes as a result of a crush. It is the high ranking opportunity to ensure survivors to recover and get back to their normal livelihood. In an effort to broaden the post-crash system, we have to establish strong institution by improving a response time effectiveness of the existing free ambulance phone number (939) used for access by the public, provide care at the scene, Transport and hospital based emergency care.

3.9.3. PRE-HOSPITAL CARE

(Abdulkadir, 2015) Define pre-hospital trauma care as "any initial medical care given to an ill or injured patient by a paramedic or other person(s) before the patient reaches the hospital emergency department. It involves the process of controlling bleeding, treating broken bones, managing pain, addressing shock, treating burns/wounds. In addition, the study carried out by (Baru, et al., 2019) showed that, among the total 363 patients attending emergency department of public hospital in Addis Ababa, only 52(14.3%) of victims had pre-hospital care. The data entails that in post-crash scenario most of the deaths were taken place at that particular accident spot location. To reduce the post crush effect severity and provide an early assistance, there should be an integrated effort and standby forces that can promptly react by the time it deemed to be necessary. To manage road traffic accidents, there should be an integrated effort from Police, Health professionals and fire brigade crews.

3.9.4. EMERGENCY RESCUE SERVICES

The study conducted by (Ang, et al., 2012) discussed that, developing nations has shown a 25% decrease risk of death from trauma in areas that had a pre-hospital trauma system. Furthermore, the research by (Sultan, et al., 2015) reveal that Ambulance transport time in Addis Ababa was twice as long time compared to international recommendations of less than eight minutes for emergent transports.

During accident events first responders composed of fire brigades, medical crew and police should arrive to the scene. The police is supposed to manage crowds on site and protect further accidents not to happen due to people gathering and panic. If the accident involves fire, the fire brigade has to play a pivotal role in putting out before any intervention takes place. Thus, police and fire brigades should share common first aid medical skills to provide early on-site support in a situation where the medical team are late to arrive on site.

3.9.5. INSTITUTIONAL SETUP

Due to situational coerce, the Ministry of Health has launched a particularly dedicated hospital known as Abet Hospital in Addis Ababa that serve emergency cases in order to improve the ease of access for emergency treatment. Furthermore, Addis Ababa Fire and emergency prevention and control Authority (AAFEPCA), combined with few private companies like Tebita Ambulance provide pre-hospital emergency services for the city. As an additional responsibility the ministry should work to open additional dedicated branches in other

towns to minimize crowds leading to the center and provide assistance in close proximity. The facility can be launched in the existing hospitals in the particularly specialized department level.

4. CONCLUSION

Road transport is the most dominant mode of transport system in Ethiopia. An increase in population size, robust and sustained economic growth recorded over the last consecutive years has intensified the high demand of road transport resulting with an increased vehicle fleet ownership. The rise in vehicle number has exacerbated the existing traffic accident. Currently Road Traffic accident has become a major global public health problem. In Ethiopia it has remained the sixth deadliest factor. The RTA encountered in 2018 accounts for 1074 light physical injury, 1903 severe injury, 459 fatal and 28,364 property damage (excluding physical injury) that was estimated to be ETB 109,882,371.

Among the reported road traffic accident related injuries and fatalities, pedestrian accounts for the nearly 75% of the proportion and economically active population take the burden. On top of that, delay in ambulance transport time should improve against the international recommendations of less than eight minutes to minimize the trauma (Sultan, et al., 2015). Moreover, a very prompt and response time effectiveness has to be ensured for free ambulance phone number (939) serving for the public. The risk and the level of threat of road side accidents also require mainstreaming the awareness raising mechanisms to wider public very aggressively and incorporating it to the school curricular to educate students from early childhood. Road side traffic accidents are killer not only with a slight mistake from the drivers but also with a carelessness of the pedestrians. Hence, it's not only law abiding drivers that the law or awareness raising should address but also law abiding pedestrians in cities and towns of the country.

Stakeholder platforms, involving all pertinent sectors of the government and society, which consults, advocates and educates the public at large should also be created in addressing the issue. Social movements, activism and media campaign should be encouraged to allow the public set the agenda for a better national policy and its subsequent implementations. Ethiopia should also aggressively work in experience sharing activities in terms of its learning from other countries when it comes to vehicle importation and fleet management. The country might benefit from one time tax of these used cars, but the subsequent and cumulative environmental, economic and social damages caused as a result of these used cars might be much higher than the initial tax the country earned.

Working in coordinated and collaborated manner is not and should not only be in policy making but also in trying to address the accident. Prevention, Mitigation, preparedness, including that of post-crash care /recovery and rehabilitation/ requires an extreme and well organized collaboration and resource mobilization of different stakeholders in addressing the issue timely, in saving lives. Furthermore, as a country rather than to often adopt foreign design standards, it needs to develop its own design standards which can simulate actual climate and topographic nature that can thoroughly assure road safety aspects.

Hence, traffic accident and its subsequent impacts should be considered as a priority area to be addressed by the federal government of Ethiopia in terms of coming up with the right policy that considers the level of damage it's causing to economy, society and the environment. The policy should also consider the current institutional capacity and organizational framework and rearrange to realize its smooth implementation if need be.

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