

Road traffic accident: The neglected health problem in Amhara National Regional State, Ethiopia

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Abstract

Background: Road traffic accident is a major but neglected public health challenge. There is a paucity of published data on road traffic crashes in Amhara National Regional State.

Objective: This study attempts to describe the main causes and consequences of road traffic accidents in the Amhara Region.

Methods: This descriptive study employed secondary data collected by Amhara National Regional State Police Commission from 2007-2011. Mortality rate, percentage, line and bar graphs were used to show the causes and consequences of road traffic accidents.

Results: Almost half (51%) of all crashes involved freight vehicles followed by passenger vehicles which constitute one-third (34.5%) of all the accidents. Over half (54.8%) of the accidents occurred on interstate highways. Passengers accounted for the largest share of road traffic deaths across the region and pedestrians were the main victims in the urban areas. Errors committed by drivers are the chief causes of the accidents, such as failure to give priority to pedestrians, speeding, failure to stay on the right side of the road, failure to maintain distance between vehicles and failure to yield the right of way for other vehicles. Overall, these factors accounted for 83.8% of all traffic accidents.

Conclusion: Road traffic crash is a major public health problem which contributes significantly to the morbidity and mortality rate in the Amhara Region. Thus, taking the seriousness of the problem into consideration, ANRS Police Commission and Trade and Transport Bureau have to work aggressively on issues related to licensing and bringing behavioral change on drivers in order to alleviate road traffic accidents. [*Ethiop. J. Health Dev.* 2014;28(1):3-10]

Introduction

Road traffic accidents are the major but neglected public health challenges. Road traffic accident (RTA) is defined as a collision or incident involving at least one road vehicle in motion that can be on a public or private road to which the public have the right of access. Thus, RTA can be a collision among vehicles, between vehicles and pedestrians, between vehicles and animals, or between vehicles and geographical or architectural obstacles (1). Injuries and deaths caused by RTAs are major public health problems, especially in developing countries. Ethiopia has experienced high rates of road traffic accidents, as the road is the major means of transportation. From 2001/02-2004/5, the traffic accident death rate was in the range of 129 and 145 per ten thousand motor vehicles (2). Furthermore, Ethiopia has a relatively high accident records despite having low road network density and vehicle ownership.

Road traffic injury which is a physical damage of a person as a result of road traffic crash is the major cause for traffic fatalities (any person killed immediately or dying within 30 days as a result of road traffic injury crash). Road traffic injuries are the eighth leading cause of death worldwide (3).

RTA related fatalities disproportionately affect pedestrians rather than vehicle passengers. A report in 2008 states that over 1.2 million people die each year on the world's roads and between 20 and 50 million suffer non-fatal injuries. From this, over 90% of the world's fatalities on the roads occur in low-income and middle-

income countries, which have only 48% of the world's registered vehicles (3). The highest burden of injuries and fatalities in developing countries are shared among pedestrians and passengers of buses and minibuses (4). For those in their productive years, or whose ages are between 15-29 years, road traffic injury is expected to be the fifth leading cause of all deaths by 2030 (3).

Road traffic injuries are the major public health and development challenges that will worsen if effective steps are not taken to curb it. Road traffic crashes affect not only the health of individuals but also their family members, as it can drive households into poverty when they struggle to cope with the long term consequences of the events, including the costs of medical care, rehabilitation and loss of family's breadwinners (3). RTAs have also a huge strain on national health systems, many of which already suffer from woefully inadequate level of resources.

Various studies done on road traffic accidents in Ethiopia have shown the escalation of the problem at the national level. Road traffic injury is high in Ethiopia, at least 70 people die for every 10,000 vehicle accidents annually (5). According to Road Transport Authority report, 1,800 people died and 7,000 injured in 2003 across the country (6). In 2007/8, 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 (7). Amhara region accounted for 27.3% of the total road traffic accident-related deaths in Ethiopia during the year 2008/9, which is the highest share among all regions (8).

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This entails the need to examine the causes of accidents in the region.

To date, there has been no detailed research on road traffic accidents using pooled data in Amhara National Regional State (ANRS). The aim of this study, therefore, is to describe the main causes and consequences as well as spatial and temporal variation of road traffic accidents in ANRS.

Methods

Study Design:

A descriptive study design was used. The study was based on road traffic accident data collected by ANRS Police Commission. Police records contain the frequency of road traffic crashes, and information on each crash, including demographic, social, economic, and information of the individual (s) involved. They also include a description of the crash itself, environmental conditions at the time of the crash and vehicular characteristics under investigation. The driver's license and the required documents for the vehicle were also reviewed. From these sources, we used data inputs that were available and complete. Due to missing information and misreported cases, the number of actual road traffic accident in ANRS is greater than the ones presented in this study. The data aggregated from 11 zones and two City Service Administration Offices in ANRS, from 2007 through 2011 were analyzed.

Study Subjects:

The subjects are individuals who were involved in 10,162 road traffic accidents between 2007 and 2011.

Data Analysis:

The present study used mortality rate, percentage change, line and bar graphs to show the causes and consequences of road traffic accident. The Haddon Matrix was

employed as an analytical tool to classify the risks factors that result in traffic accidents (Table 1). According to William Haddon, there are three phases in the time sequence of a crash event: pre-crash, crash, post-crash as well as human, machine and environment that can interact during each phase of crash. The resulting nine cells in Haddon's Matrix model a dynamic system allowing opportunities for intervention to reduce road crash injury. The Matrix was used to classify the key, potential risk factors for road accidents in the sampled area (9).

Ethical Considerations:

The overall research design was approved by the Bahir Dar University Ethical Clearance committee. Formal letters of support were written to ANRS Police Commission and Zonal Police Departments to access the data.

Results

Study Area:

The study was conducted in ANRS, which is located in North Western Ethiopia (Figure 1). The region has 11 administrative zones, which span an area of 170,000 km² and serve a population of over 18 million (10).

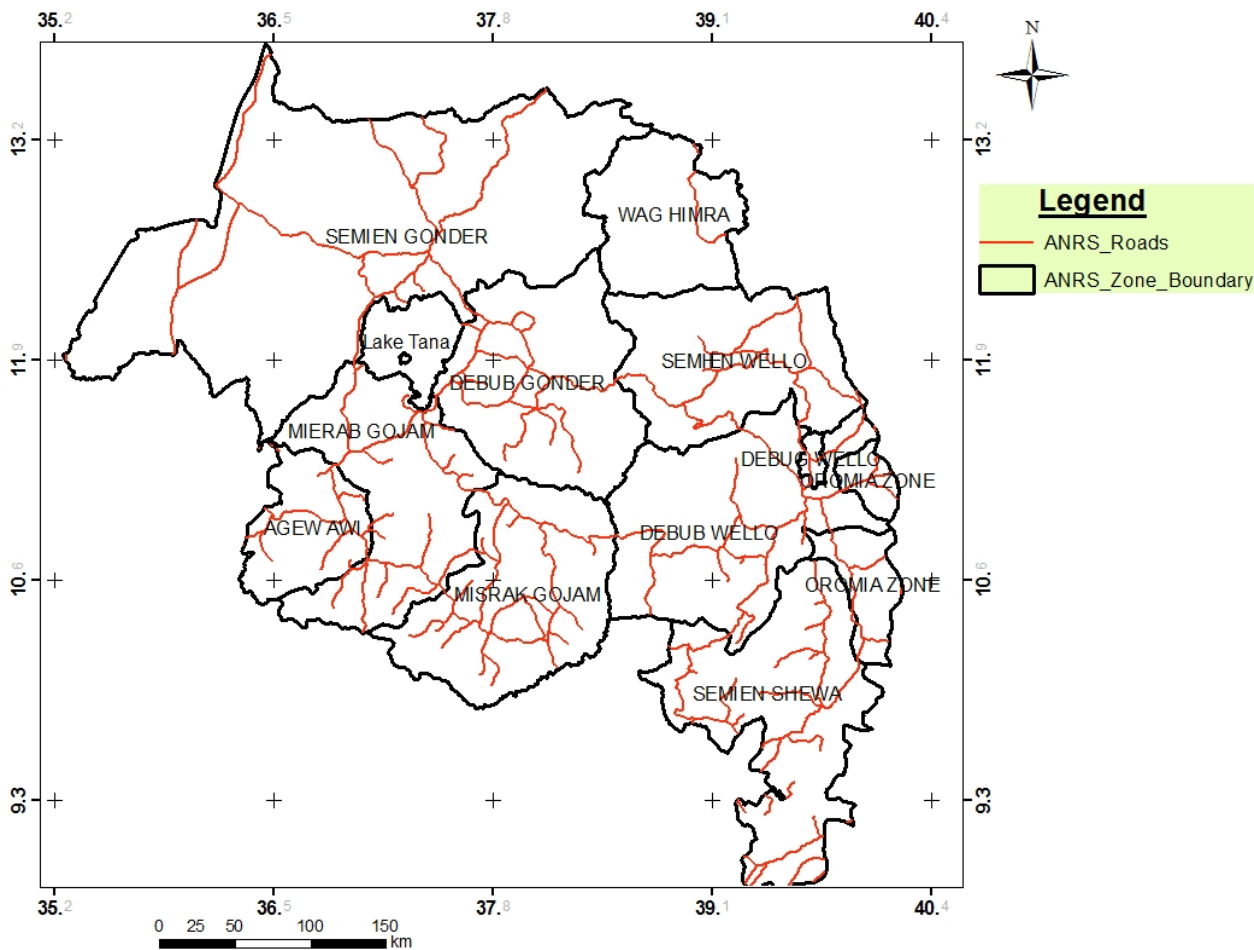
Road Accident Differentials:

During this period, (88.4%; 8984) private and (11.6%; 1178) government vehicles were involved in 10,162 police recorded road crashes (Table 2). A total of 9,255 road traffic accident cases were reported to the ANRS Police Commission during the study period. All of these cases were included in the study. Of these vehicles, almost half (51%; 4,721) of all the crashes were accounted for freight vehicles followed by passenger vehicles (34.5%; 3,189) and small and other vehicles (14.5%; 1,345).

Table 1: **The Haddon's Matrix**

PHASES		FACTORS		
		HUMAN	VEHICLES AND EQUIPMENT	ENVIRONMENT
Pre crash	Crash prevention	Information Attitude Impairment Police enforcement	Roadworthiness Lighting Braking Handling Speed management	Road Design and road layout Speed limits Pedestrian facilities
Crash	Injury prevention during the crash	Use of restraints Impairment	Occupant restraints Other safety devices Crash protective designs	Crash protective roadside objects
Post crash	Life Sustaining	First aid Skill Access to Medics	Easy of access Fire risk	Rescue facilities Congestion

Source: WHO, 2004



Source: Central Statistical Authority, 2007.

Figure 1: Road map of ANRS

Table 2: Severity of crash by category of vehicles types

Vehicles type	Fatal	Injury	Property Damage	Total
Small Vehicles	206	685	444	1335
Freight Vehicles	1106	1480	2409	4995
Passenger Vehicles	738	1536	1164	3438
Others	111	152	192	455
Total	2167	3890	4105	10162

The highest number (54.5%; 5030) of crashes involved vehicle-pedestrian interaction. The vehicle-vehicle collision was (10%; 907) while vehicle-road-structure crashes was (35.5%; 3318) (Table 3). Passengers in vehicles injured were 3,028. The majority of crashes (83%; 8,521) occurred during the day. The highest number (91%; 8521) of accidents every study year was observed in the rainy months. The majority (54.8%; 5,589) of road traffic accidents occurred on interstate highway, while (25.5%; 2,591) occurred in urban centers (Figure 2).

Magnitude of Road Traffic Accident in ANRS: Between 2007 and 2011, 10,162 road traffic accidents were reported, claiming the lives of 2,761 people, injuring 3,890 people and caused property damage worth 128,398,879 birr (Figure 3).

Table 3: Types of road traffic crashes

Type of interaction	No	%
Vehicle-pedestrian	5030	54.5%
Vehicle-road structure	3318	35.5%
Vehicle-vehicle	907	10%
Total	9255	100%

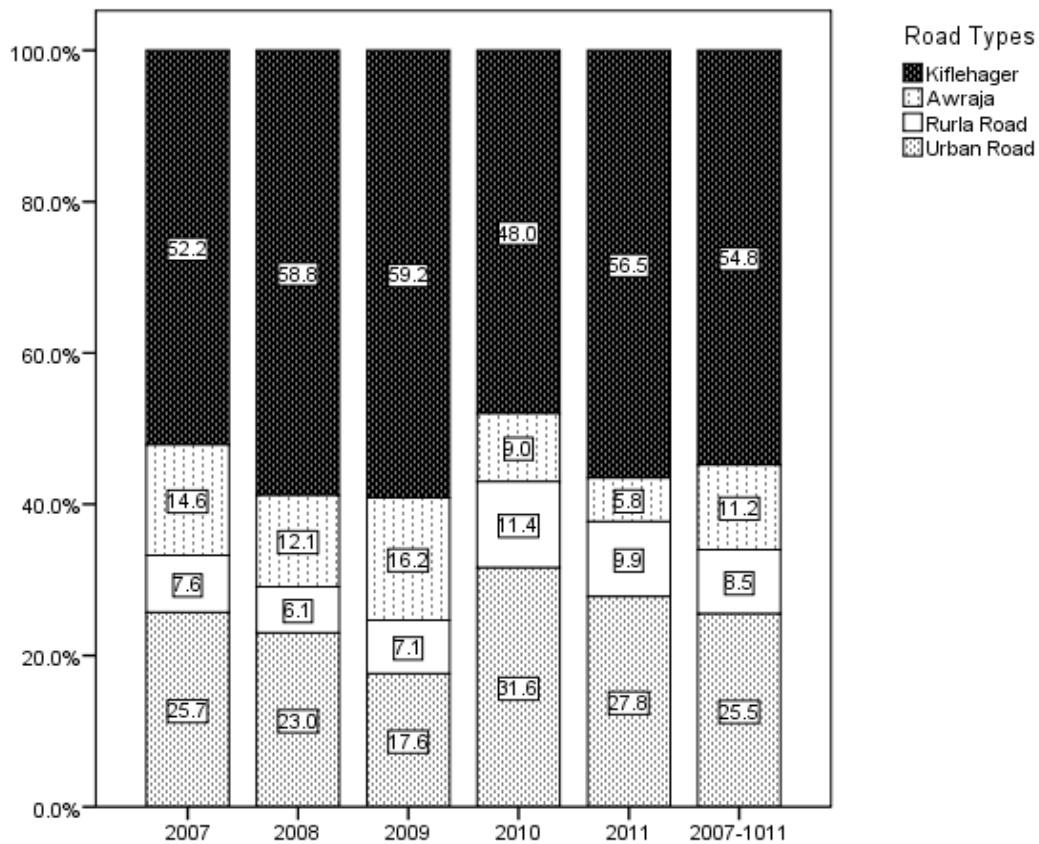


Figure 2: Traffic Accidents by Road Types Amhara Region 2007-2011

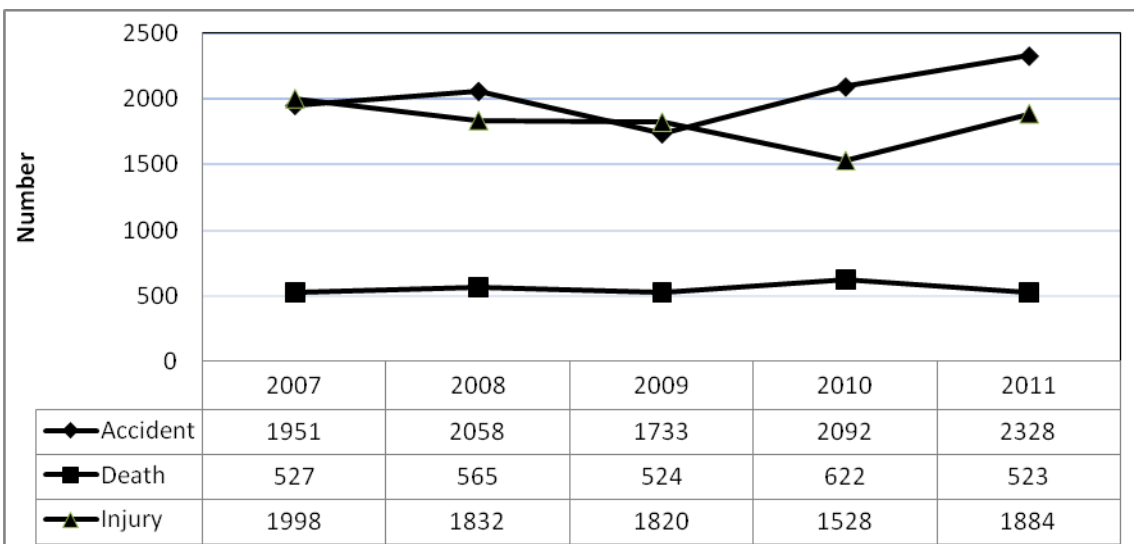


Figure 3: Road Traffic Accidents in Amhara Region 2007-2011

The data obtained from ANRS Police Commission show that in 2011 road traffic accidents caused the death of 523 people. This means that at least one person was killed each day of the year in this region. Besides, it is estimated that about 1,884 people were injured or disabled in the same year.

There was a considerable variation in absolute number of road traffic accident deaths and mortality rates across zones. North Gondar, South Gondar and South Wollo Zones recorded the highest absolute number of deaths in 2011, with just over 250 followed by East Gojjam and *Ethiop. J. Health Dev.* 2014;28(1)

North Wollo with less than 130. Wag Himra and Bahir Dar experienced the lowest number of traffic deaths (30 persons).

Geographic and Demographic Trends in Road Traffic Accident in ANRS:

There was a clear zonal difference in the distribution of road users' mortality (Figure 4). Pedestrians account the

highest proportion of road traffic deaths in urban areas: Gondar, Bahir Dar and Dessie accounted for a percentage of 86.3, 54.8 and 48.5 respectively. In other zones, the main victims of road traffic accidents were found to be passengers. At regional level, 56% of people killed were passengers in vehicles, while pedestrians accounted for 35.7% (Figure 4).

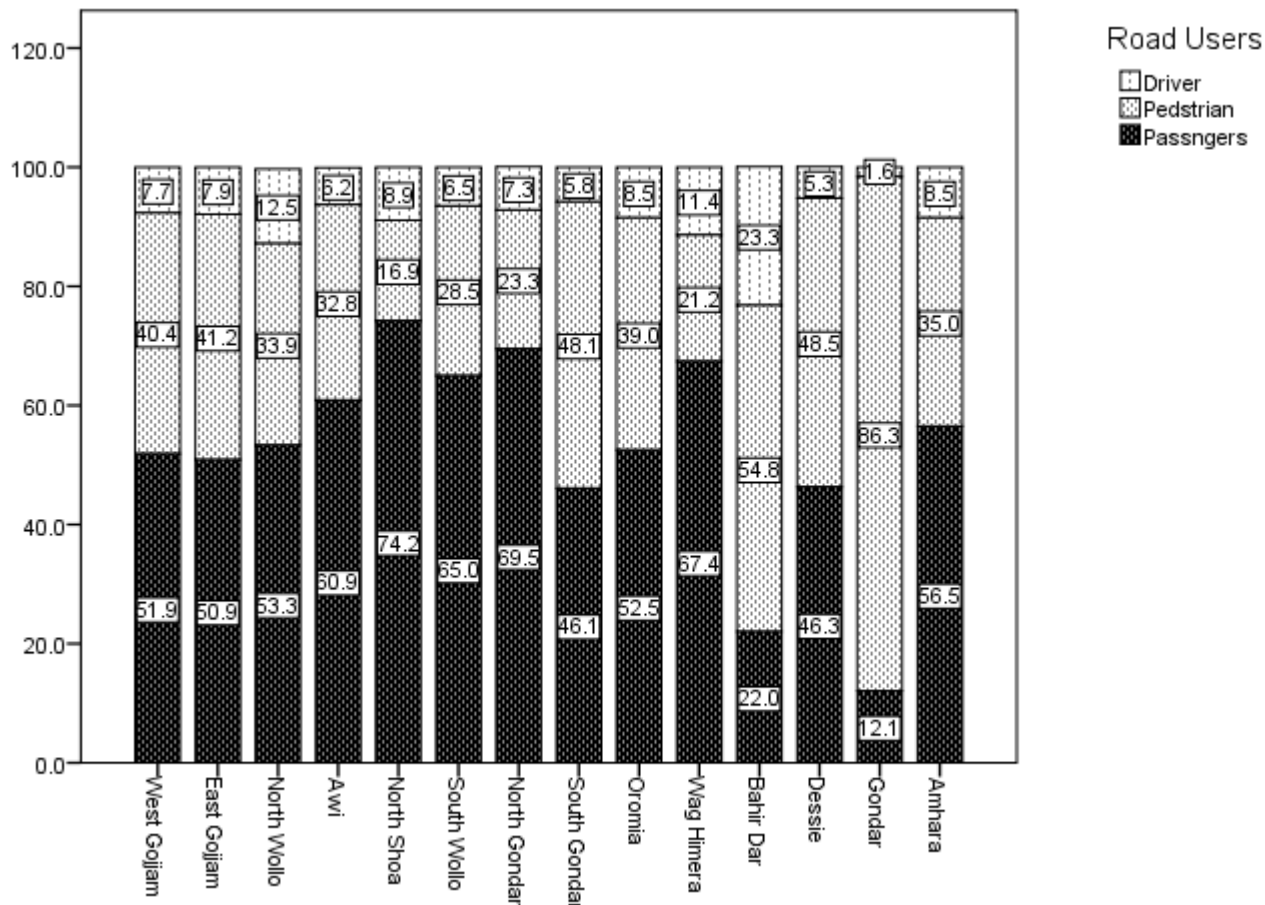


Figure 4: Road users Killed in various Modes of Transport as Proportion of all Traffic Deaths in Amhara Region 2007-2011

The analysis of road traffic deaths by sex and age group showed a uniform predominance of males over females in all age categories; where males accounted for almost 80% of deaths. The working age group between 15 and 50 years accounted for more than two-thirds of all road

traffic deaths (Figure 5). This has a great impact on the family and on the nation at large because the loss of such active working group may lead to foregone GDP due to the diminished workforce and economic shock to families that have lost a breadwinner.

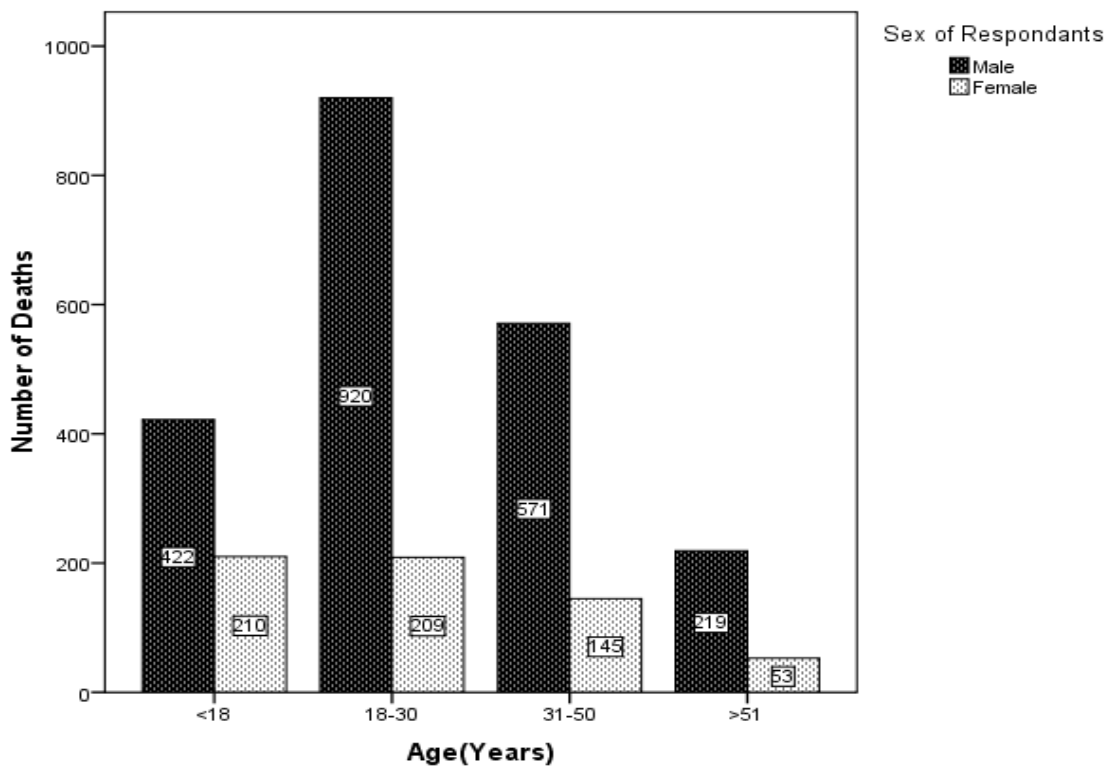


Figure 5: Road Traffic Deaths by sex and Age Group, Amhara 2007- 2011

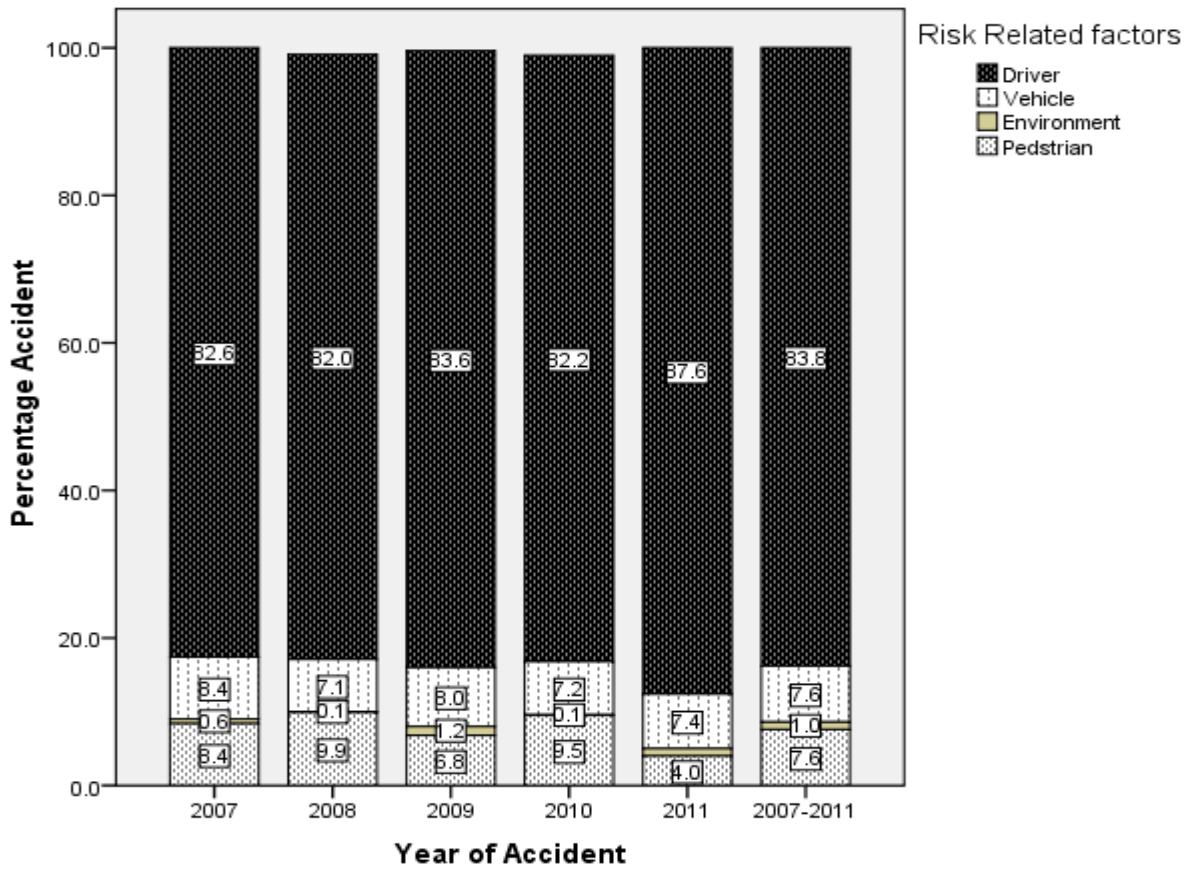


Figure 6: Risk Factors Related with Traffic Accidents in amhara Region 2007-2011

Factors Leading to Road Traffic Accidents in ANRS:

The Haddon Matrix was done to identify factors that cause road traffic accidents. The results show that the lion's share of the accidents was drivers' related for the period under consideration (Figure 6). At regional level, almost 84% of road traffic accidents were faults attributed to the drivers while vehicles and pedestrians faults' accounted for 7.6% each and the environment shared only 1%. From drivers' faults, the five major accident factors, in order were: failure to give priority to pedestrians (32.1%), speeding (31.5%), driving on the wrong side of the road (10.7%), failure to maintain distance between vehicles (4.1%) and failure to give priority for other vehicles (3.8%). Together these five causes accounted for 83.8% of all road traffic accidents.

Discussion

The study did not attempt to review the organizational structures of road traffic affiliate institutions to comment on their cooperation in mitigating road traffic crashes in the region. The actual road traffic accident in ANRS could be higher than the one presented in the study due to underreporting. Moreover, it is not possible to incorporate the views of drivers and injured persons to substantiate the data. Due to data limitation the pre-crash and post-crash events were not analyzed using the Haddon Matrix.

The overall findings of this study indicate that the prevalence of road traffic accidents was associated with various factors. In ANRS, nearly 91% of the risk factors were associated with human risk behavior which is a similar finding to a study conducted in Mekele Town, where 96% of the causes of road traffic accidents were related to human risk behavior (11). Research findings indicate that in many countries, many of the road traffic accidents are not reported to the police and even some of the reported crashes are not recorded. Thus, in those countries hospital data on road casualties are used to supplement police data (12). The situation of having recorded data on road traffic accidents is worst in Ethiopia because hospitals do not record separately road injury and casualties information which could be used as an important research input in addition to the police data to clearly show the magnitude of the problem in the country. Human factor is the most potent contributor to road traffic accidents in ANRS and some other countries like Nigeria and India (13). For example, a study conducted in India indicated that human characteristics, such as rushing and negligence make up 95.4% of the total road traffic accidents (1).

Speeding is another factor which accounted for 31.5% of the total crashes in ANRS. In Ghana, the speed factor alone accounted for more than 50% of the crash. Reducing vehicle speed was one of the most effective interventions employed to stem traffic crashes on

Ghanaian roads. As a result, installed rumble strips and speed humps reduced crashes by about 35% and fatalities by about 55% (4). Pilkington and Kinra (2005) reviewed fourteen studies and concluded that speed cameras are effective intervention in reducing road traffic collisions and related casualties. Reductions in outcomes across studies ranged from 5% to 69% for collisions, 12% to 65% for injuries, and 17% to 71% for deaths. (14).

It was also found that the number of road traffic accident varies across seasons. In ANRS, 91% of the road traffic crashes occurred in the rainy season during the months of June-September. Similarly, in India, the highest numbers of accidents (32.30%) were observed in the heavy rainy season during the months of July – September (1).

In ANRS, road traffic accident casualties were 12 per 100,000 populations, which is by far lower than the average road traffic injury mortality rate in sub-Saharan Africa of 28.3 per 100,000 populations (15). Besides, in ANRS passengers represent the majority (56.5%) of victims followed by pedestrians (35%) and drivers (8.5%) of all road traffic crash deaths between 2007 and 2011. A different result was found in a hospital-based study conducted in Tanzania where pedestrians accounted for the majority (55.4%) of victims, followed by passengers (27.2%) and drivers (17.2%) (16).

The distribution of road traffic accident deaths also varies across low-income, middle-income and high-income countries. In high-income countries crashes involve primarily privately owned vehicles with the driver being the main car occupant injured or killed (17). In ANRS, 8.5% of the fatalities accounted for drivers, while in USA, 60% of the fatalities accounted for car drivers (18). About 45% of road traffic fatalities in low-income countries are among pedestrians, whereas an estimated 29% in middle-income and 18% in high-income countries are among pedestrians (19).

In terms of age group, the present study revealed that the majority (more than two-third) of the RTA victims was between 15 and 50 years old. Similarly, a hospital based study in India showed that the majority of the victims were in the age group of 15-50 years (20). This shows that RTAs highly affect the most active and productive part of the population which leads the country to incur loss in its economy.

With regard to gender difference, this study shows that the overwhelming majority (80%) of the victims were males. This is consistent with a previous hospital based study done in India where 67.2% of the road traffic crash victims were males (13). This might be attributed to the greater exposure of males on streets in particular and outside home in general.

Conclusion:

The study has demonstrated that road traffic accidents in ANRS are pressing problems with health and economic development ramifications. Therefore, further studies on risky behaviors that cause RTAs should be conducted. Urgent preventive measures with a target to reduce the occurrence of road traffic crashes are necessary to reduce the morbidity and mortality resulting from these injuries. Deploying traffic policemen mainly in towns, without other preventive measures is not an effective strategy to reduce road traffic accidents. Installing a camera along main streets and intersections with high traffic accidents could be a more cost-effective way of mitigating the violation of traffic laws and penalizing those who transgressed traffic laws. Physical speed restraint measures such as rumble strips and speed humps can be installed on roads to reduce speeds of vehicles. These will have immense beneficial effects at locations with a high frequency of traffic crashes. Besides, ANRS Police Commission and the Trade and Transport Bureau should work in concert and in a cooperative way to monitor and enforce traffic regulations in order to improve the qualification of drivers.

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