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Prevalence of road traffic accident and associated risk factors among drivers of three and four-wheeler vehicles, western Ethiopia, 2017

Abstract

Background: Nowadays, worldwide road traffic-related injuries, disabilities, and deaths are becoming a major public health threat. It is projected that by the year 2020, road traffic injuries are becoming the third-largest cause of disabilities in the world. More than 85% of the world's road fatalities are attributed to developing countries.

Objective: This study aims to assess the prevalence of road traffic accident and associated factors among drivers of three and four-wheeled vehicles in East Wollega, Western Ethiopia 2017.

Methodology: A cross-sectional study design was employed to gather information from 400 drivers of three and four-wheeled vehicles from February to March 2017. Data were entered into Epi info version 3.5.3, cleaned and analyzed using SPSS version 20. Bivariate and multivariate analyses were used to examine the association between dependent and independent variables. Statistical significance was declared at P-value 0.05.

Result: The data were collected from 400 drivers making response rate of 94.6%. The mean age of the study participants was 28.4±4.3. About one third (33%) of the drivers encountered an accident in the last one year. Living in urban (AOR=0.29, 95% CI [.09-.095]), Age of respondents 25-34 years (AOR=2.58, 95 %CI [1.46-4.54]) & >=35 years (AOR=2.53, 95%CI [1.20-5.33], sometimes angry(AOR=0.40, 95% CI [0.21- 0.77], don't angry at all (AOR=0.26, 95% CI [0.11- 0.60], Mobile speaking habit while driving (AOR=1.67, 95% CI [1.21- 2.74]), driving on straight road (AOR=0.5, 95% CI [0.31-0.78]) and being penalized (AOR= 1.89, 95% CI [1.18-3.06],) were among factors associated with road traffic accident.

Conclusion: The prevalence of road traffic accident revealed in this study is a public health significance**.** The most perceived cause of road traffic accidents mentioned was an overcrowded road which is shared by drivers, pedestrians, and animals. Therefore, it is better if the zonal and town transport agency office work on the management of road traffic utilization and continuously follow the driver's behaviors.

Keywords: road traffic accident, drivers, vehicle, East Wollega, public health

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Abbreviations: LMIC; low and middle income countries, RTA; road traffic accident, SPSS; statistical package for the social sciences, STEPS; stepwise approach to surveillance, UAE; united arab emirate

Introduction

Globally, pedestrians share the road with different types of vehicles like cars, trucks, buses &, motorcycles as well as also with the animals.[1] These days, transportation is the riskiest & intricate system that people deal with in their daily lives.[2] Unacceptable deaths & disabilities are happening as a result of road traffic injuries. The socio-economic & health burden it creates is challenging the sustainable development of the nations.[3] The International Federation of Red Cross and Red Crescent Societies have described the situation as "a worsening global disaster destroying lives and livelihoods, hampering development and leaving millions in greater vulnerability".[4]

Globally, in 2013 around 1.25 million people had died as a result of a road traffic accident & 50 million peoples have encountered non-fatal injuries. About half of the victims are pedestrians, cyclists & motorcyclists in the urban areas. Most of the road traffic accident deaths (90 %) occur in Low- and Middle-income countries (LMICs) where the death rates (21.5 and 19.5 per 100 000 populations respectively) are double of those for high-income countries.[5]

The most widely accessible & affordable transportation in Africa is road transport as the air & rail transport are either costly and even in some part the region not available at all.[5,6]

In Africa, about one-quarter of injury-related deaths are attributed to road traffic accidents (RTA). In 2008, road traffic accidents caused approximately 158,000 deaths and were the 13th ranked cause of fatalities, accounting for 2.3% of all deaths in the continent. Nigeria and Ethiopia contributed to a high proportion (23%) of road accident-related deaths to the continent's.[7]

According to the STEPS (Stepwise approach to surveillance) survey made in Ethiopia, about 3 million people have experienced road traffic accidents in 2015, among whom 18% had a serious injury. The gap between urban & rural is narrow which is 2.8% vs 2.6% respectively.[8]

The economic burden of road traffic accident extends from household to the global level.[2] Many households have disintegrated & driven into deeper poverty due to the death of their family breadwinners, funeral costs, earning loss due to long term care for those in rehabilitation & the cost of prolonged medical care.[9]

Globally, the economic impact road traffic accident is relatively huge as it is estimated that the US $518 billion is spent on RTAs', with the US $65 billion being expended in low- and middle-income countries, which is reported as being bigger than the development aid these countries receive per year.[10] A road traffic accident can be attributed to multiple factors: including human or driver errors, types of vehicles, traffic infrastructures like that of engineering design, road maintenance, and traffic regulation among others.[11]

In some, high-income countries the road traffic injury fatality rate showing a declining trend. However, the global RTA injury & death rate is still high due to the rapidly increasing road traffic accidents injury & deaths in low- and middle-income countries.

Therefore, this study aims to assess the prevalence of road traffic accidents among drivers of three & four-wheeler vehicles in Western Ethiopia.

Methods & Material

Study design setting and sites

A cross-sectional study design was employed among drivers of three and four-wheeled vehicles in Nekemte, East wollega zone, western Ethiopia from February to March 2017.

Study population

The participants of this study were drivers of three and four-wheeled vehicles which serve as a taxi in Nekemte town and those vehicles who initially depart from Nekemte town to the neighboring towns and villages only in the zone and again from there who were destined to Nekemte town during the data collection period.

Sample size and sampling procedure

The sample size was calculated using a single proportion formula considering the following assumption A 95 % confidence interval

i. 50 % population proportion

ii. 5 % marginal error

$$n = \frac{Z^2 P(1-P)}{d^2} = \frac{1.96^2 0.5(0.5)}{0.05^2} = 384$$

Where, n= sample size, p= proportion, d= margin of error, including 10% non-response rate the total sample size become n= 423. Those vehicles which are available during the data collection period were included until the sample size is fulfilled. To avoid duplication after convincing the drivers their vehicle identifier number was used for purpose of identification which wasn't used in entry or analysis of the research data.

Data collection tool and procedure

The questionnaire was prepared in English then translated to regional language (Afan Oromo languages) and translated back to the English language by language experts. Two supervisors together with principal investigators had supervised the data collection process. Seven data facilitators had participated in the study. The training was given to data facilitators and the supervisors before the actual data collection. About 5% of the questionnaire was pre-tested two weeks before the start of the actual data collection in an area where actual data collection didn't take place. After the pre-test, the questionnaire was revised, edited, and corrected to avoid ambiguity and unclearness.

Data management and analysis

After data collection, each questionnaire was checked for completeness and consistencies. Data entry was done by using Epi info version3.5.3. The entered data have been cleaned and analyzed by using SPSS version 20. Descriptive statistics such as frequency, percentage, mean and standard deviation were used to describe selected variables. Bivariate & Multi-Variate analysis was performed using binary logistic regression to assess the association between independent & dependent variables and $p<0.05$ was considered as a cut-off point to declare the significance of the variables. Odds ratio with 95% confidence was computed to dictate the strength of the association.

Ethical consideration

Ethical clearance was obtained from Wollega University research ethics review committee. A permission letter was also obtained from the East Wollega Zone transport agency. Informed written consent was obtained from all study participants. All the study participants were assured that the data collection process was anonymous. The objective of the study was explained for participants & they were given the chance to raise any concern they have as well as their right to refuse or withdraw at any moment during the study.

Result

Socio-demographic status

A total of 400 (94.6%) study participants with the age range of 18–72 years and mean age of 28.4 years (SD±4.3) responded to the questionnaire. The majority of the respondents 60% (n=239) were single by marital status and Forty-two percent (n=168) of them were orthodox Christian followers by religion. More than three quarters (n=316) of the study participants were ethnically Oromo. Nearly half of the study subjects 46.3% (n=185) educational status is High school attendees (grade 9–12). Seventeen percent (n=70) of them had an additional job and their median monthly income was 2000 Ethiopian birr (61.29 dollars). The median family size of the respondents was four (Table 1).

Characteristics of drivers and vehicle

The types of vehicles driven by the respondents were Bajaj (three-wheeler mini-car with three seats) 46.5%) (n=186) followed by mini-bus (vehicle with twelve seats) 35.3% (n=141) while the rest 73(15.2%) of them were minibus with 17 seats, mid-bus with 45 seats and Bus with above 45 seats. The majority of the drivers 62.5% (n=250) are recruited by the owners of the vehicles. Most of the drivers 82.7% (n=331) had the driving experience of fewer than five years and one hundred fifteen 28.8% (n=115) of them held a driving license which was given 2-5 years back and 3% (n= 12) of them responded that they haven't currently held any license. Besides, the respondents explained the road they regularly drive on a road with bends 219(54.17%) while 181(45.3%) mention straight road (Table 2).

Table 1 Socio–demographic characteristics of drivers of three and four–wheel vehicle in east Wollega zones, Oromia region, Western Ethiopia 2017 (N=400)

Variables		Frequency	Percent (%)
Age			
	18–24	106	26.5
	25–34	230	57.5
	35–44	49	12.3
	45+	15	3.8
Marital status			
	Single	239	59.8
	Married	140	35
	Others	21	5.2
Religion			
	Orthodox	168	42
	Protestant	130	32.4
	Muslim	63	15.8
	Others	39	9.8
Ethnic group			
	Oromo	316	79
	Amhara	51	12.5
	Others	34	8.5
Educational level			
	Grade 1–4	30	7.5
	Grade 5–8	59	14.7
	Grade 9–12	185	46.3
	Higher education	126	31.5
Additional Job			
	Yes	70	17.5
	No	330	82.5
Family size			
	1–3	171	42.7
	4–6	165	41.3
	>6	64	16
Average monthly income			
	100–1000	133	33.3
	1001–2000	117	29.3
	2001–3000	56	14
	3001–5000	43	10.7
	>5000	51	12.7

Personal and driving habit of drivers

In this study, 54(13.5%) of the drivers were reported their personality as being easily angered and 101(25.3%) of them feel competitive while driving. Khat and alcohol use while driving was mentioned by 17% and 8.5% of the drivers respectively. Fifty-one (12.8%) of them describe their driving behavior as aggressive. While driving 143(35.8%) and 161(40.2%) of them hear Radio/FM and Music respectively. More than one fifth (21.5%) of the respondents had driven beyond their speed and more than a quarter of them (26.5%) of them failed to check the mirror before pulling out in the last year. Besides, speaking to mobile while driving was reported by 25% (n=100) of respondents (Table 3).

Table 2 Characteristics of behicle and the experience of drivers among three and four wheels in East Wollega zones, Oromia region, Western Ethiopia 2017 (N=400)

Variables	Frequency	Percent
Types of vehicle		
Bajaj (three wheels)	186	46.5
Minibus (12 seats capacity)	141	35.3
Minibus (17 seat Capacity)	36	9
Mid–bus (45 seats)	16	4
Public transport above 45 seats	21	5.2
Relationship of the drivers to the vehicles		
Owner	124	31
Recruited/private	250	62.5
Relative to owner	21	5.3
Others	5	1.3
Driving experience in years		
≤5	331	82.7
05–10	48	12
>10	21	5.3
How many years held driving license?		
<1year	90	22.5
1–2years	86	21.5
2–5years	115	28.8
>5years	97	24.2
No license	12	3
How frequent will your car health be checked?		
Every year	353	88.3
Every two years	36	9
Every three and above years	11	2.7
Any kind of service in the last one year for car		
Yes	288	72
No	112	28
Any driver training in the last 3 years		
Yes	155	38.8
No	245	61.2
Type of road they regularly drive on		
Road with beds	219	54.17
Straight road	181	45.3

Table 3 Personal and driving habit Vehicle of three and four wheels in East Wollega Zones, Oromia region, Western Ethiopia 2017 (N=400)

Variables	Frequency	Percent
How do you express your personality?		
Easily get angry	54	13.5
sometimes angry	279	69.8
Don't feel angry at all	67	16.7
Do you feel competitive when driving?		
Yes	101	25.3
No	299	74.7
Used recreational drugs (khat, alcohol, shisha)		
Yes	99	24.8
No	301	75.2
Chewing chat		
Yes	68	17
No	332	83
Aggressive driving behavior		
Yes	51	12.8
No	349	87.2
Side talking to a person in the car		
Yes	167	41.8
No	233	58.2
Frequently listened while driving		
Radio/FM	143	35.8
Music	161	40.2
Nothing	96	24
Fail to check mirrors before pulling out		
Yes	106	26.5
No	294	73.5
Anxious in heavy traffic, bad weather/night		
Yes	151	37.8
No	249	62.2
Ever drive a car beyond the limited speed		
Yes	86	21.5
No	314	78.5
Speak to mobile while driving		
Yes	100	25
No	300	75

Moreover, Habit of wearing a seat belt was asked among the vehicle's drivers with seat belt facility except for the Bajaj and the response was 42.5% report wore it occasionally,40.7% reported as wore it always and about 4% the respondents as never wore it (Figure 1).

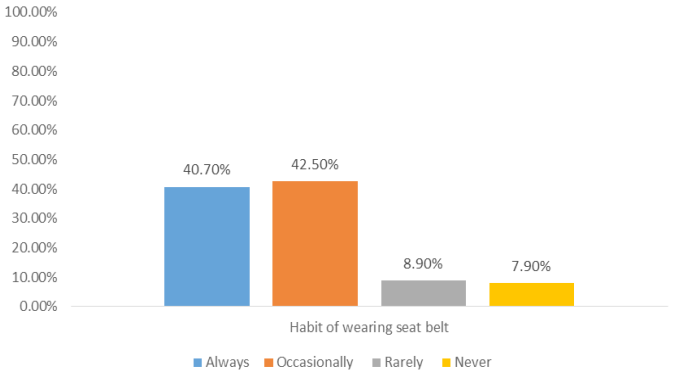

Figure 1 Belt wearing habits of drivers of three and four-wheel vehicle in East Wollega zones, Oromia region, Western Ethiopia 2017.

Road traffic accident and driving–related circumstances

In this study, 16%, 22.8%, 37.5%, 11.3%, and 8.3% of the vehicles experience defect of a brake, steering wheel, tyre, light, and other mechanical defects in the last year respectively. In the last one year, 33% (n=132) of the vehicle drivers reported as they faced an accident and the most common cause of accident reported were collision with another car in 29.5% (n=39) and pedestrian crossing road 25% (n=34). Nearly three fourth of the accident outcomes were minor injuries while five percent of the accident results in a fatal outcome (Figure 2).

Perceived reason for the occurrence of a traffic accident and traffic use

In this study, the common reason drivers believed to cause road traffic accident mentioned by majority 120(30%) of them were narrow, and overcrowded road which is shared by vehicles, pedestrians, carts and animals, 58(14.5%) mention inappropriate use of the road by pedestrians (i.e. not using their left, not using Zebra, crossing road in hurry and speaking mobile while crossing road) and 25(6.3%) of them reports inappropriate behavior of drivers(competitive driving, speaking to mobile while driving, using substances while driving and driving beyond limited speed). Other perceived reasons for the accident include lorries parked across the street worsening the narrow road, small market places across the road, unrepaired and low-quality roads, children playing on the road, drivers arguing with people, or traffic police. Furthermore, respondents were asked to describe the overall use of road traffic regulation and nearly a quarter 95(23.8%) of them described it as it is good, 109(27.2%) as bad/inappropriate, and 196(49%) as fair/medium.

Multi-variate analysis result of road traffic accident

The Multi-variate analysis in this study reveals those who live in urban areas are 71% less likely to experience RTA than those who live in rural areas. Besides, drivers with the age range of 25-34 and 35+ 2.5 times likely to encounter RTA than those with the age range of 18-24. Vehicles that receive service in the last twelve months are 41% less likely to face RTA than those who didn't.

Participants who are aggressive some times and those who weren't aggressive at all are 60% and 74 % less likely to experience RTA respectively, than those who became aggressive easily. Drivers who speak to mobile while driving are 1.6 times more likely to experience RTA than those who did not. Those who drive on straight roads are 50

% less likely to experience road traffic accidents than those who drive on the road with bends. Being penalized among vehicle drivers is nearly 1.9 times more likely to encounter RTA than those who didn't (Table 4).

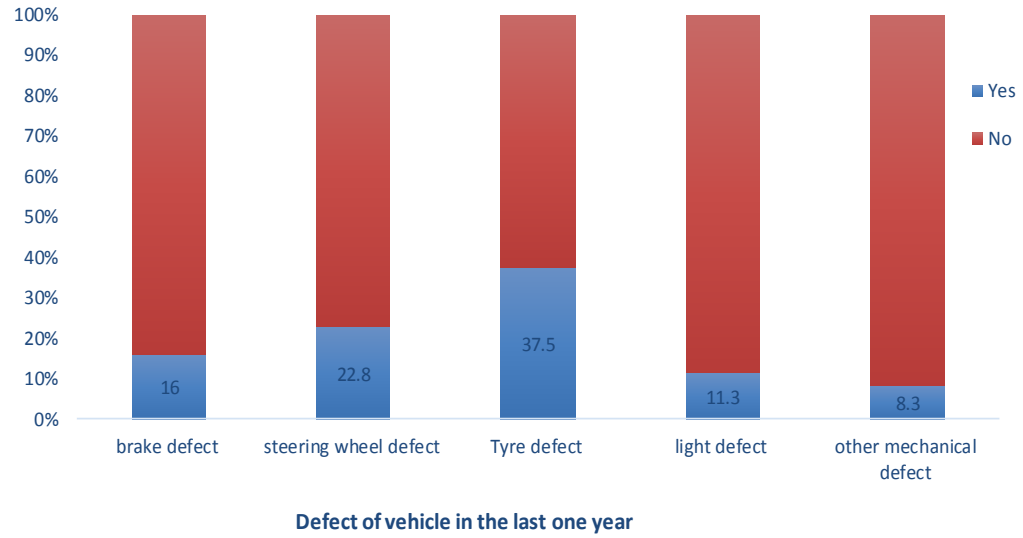

Figure 2 Defect of a vehicle in the last year among three and four-wheel Vehicle in East Wollega Zones.

Table 4 Multivariate analysis of factors associated with a road traffic accident in East Wollega zones, Oromia region, Western Ethiopia, 2017 (N=400)

Characteristics		Road traffic accident		COR (95% CI)	AOR (95%CI)
		Yes(%)	No (%)		
Place of residence	Urban	127	252	0.47(0.15–1.42)	.29(.09–.95)*
	Rural	4	17	1	1
Age of respondent	15–24	23	83	1	1
	25–34	86	144	.52 (.26–1.05)	2.58(1.46–4.54)*
	>=35	22	31	1.14(.64–2.04)	2.53(1.20–5.33)*
Educational status	<grade 8	36	53	1	1
	>= grade 8	95	216	.648(.398–1.05)	.72(.41–1.26)
Types of vehicles	Bajaj	57	129	1	1
	Mini–bus	59	119	1.12(.72–1.74)	1.07(.63–1.80)
	Bus	15	21	1.62(.78–3.36)	1.69(.68–4.23)
Relation of the person with the vehicle	Owner	47	77	1	1
	Non–owner	84	192	.72(.46–1.12)	.74(.46–1.20)
service in the last twelve months	Yes	87	201	.67(.42–1.05)	.59(.35–.99)*
	No	44	68	1	1
The personality of the driver	Easily Angry	27	27	1	1
	Sometimes angry	88	191	.46(.25–.83)	.40(.21–.77)*
	Don't feel angry at all	16	51	.31(.14–.68)	.26(.11– .60)*
Feeling competitive while driving	Yes	32	69	1	1
	No	99	200	.94(.58–1.52)	1.19(.71–2.01)
Speak mobile while driving	Yes	42	58	1.72(1.08–2.74)	1.67(1.21–2.74)*
	No	89	211	1	1

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Table Continues

Characteristics		Road traffic accident		COR (95% CI)	AOR (95%CI)
		Yes(%)	No (%)		
Chewing khat while driving	Yes	32	36	2.09(1.23–3.56)	1.52(.72–3.20)
	No	99	233	1	1
Drunk alcohol during/in–between driving	Yes	17	17	2.21(1.09–4.49)	1.16(.46–2.89)
	No	114	252	1	1
Aggressive driving behavior	Yes	21	30	1.52(0.83–2.78)	1.23(.59–2.55)
	No	110	239	1	1
Side talking while driving	Yes	59	108	1.22(.80–1.86)	.92(.54–1.56)
	No	72	161	1	1
The road always you are driving	Bends	86	133	1	1
	Straight	45	136	.51(.33–.79)	.50(.31–.78)*
Receive oral warning in the last one month	Yes	72	118	1.56(1.03–2.38)	1.49(.91–2.47)
	No	59	151	1	1
Receive Penalty	Yes	79	136	1	1.89(1.18–3.06)*
	No	52	133	1.4(.97–2.23)	1
Hearing in the car	Music/Radio/FM	103	201	1	1
	Nothing	28	68	1.24(.75–2.05)	1.12(.73–2.43)

*Statistically significant

Discussion

The finding of this study has suggested that a road traffic accident in the study area is of public health importance. Besides, age, receiving service, the personality of driver, mobile speaking, type of road driven on regularly, and being penalized were factors associated with the road traffic accident.[12]

In this study, the prevalence of road traffic accidents is 33% which is slightly lower than the study conducted among drivers in Abu-Dhabi (49% of male and 39% of female) had a road traffic accident in the last twelve months.[13] This might be attributed to the small size of the town where this study conducted as compared to a large city like Abu Dhabi where the traffic crowd might be tenser which in-turn increases the chance of RTA occurrences & also due to the socio-demographic difference.

On contrary, this prevalence of this study is higher than studies conducted in in Mekele, Ethiopia (the last three years' prevalence = 26.4%),[14] Ibadan Nigeria (in the last one-year prevalence =15.9%) among long-distance drivers[15] & drivers of public institutions in (since commencement= 16.2%),[16] Lahore Pakistan (in the last twelve months' prevalence = 12.4%) among commercial vehicle drivers[17] & UAE(United Arab Emirate), sultanate Oman (ever exposure to RTA= 44%) among road users.[18] The difference might be due to the type of study population involved, different study periods, the difference in the type of vehicles involved & the different study design used.

The use of hand-held mobile telephones can adversely affect driver behavior – as regards physical tasks as well as perception and decision-making. Results of studies on distraction and mental load show that driver reaction times are increased by 0.5–1.5 seconds when talking into a mobile telephone.[19] However, this study reveals that about a quarter of the respondents (25%) had the habit of speaking to a mobile phone while driving. Even findings in other studies dictate the wide practice use of mobile phone while driving like the one conducted at Mekele city among drivers (42.3%),[20] UAE sultanate Oman among road users (83%)[18] & Abu Dhabi (male=21%, female=22%),[15] India Gujarat (42.4%) among young drivers.[21]

The higher the speed, the shorter the time a driver has to stop and a crash may have occurred. The probability that a crash will result in injury is proportional to the square of the speed.[22] More than one fifth (21.5%) of the respondents in this study had ever driven beyond their speed, even though it sees public health importance it is less as compared to other studies conducted at UAE sultanate Oman among road users (63%)[18] & Abu Dhabi among drivers (Male=47%, Female = 65%) had occasionally[13] & rarely comply with the fixed speed limit, Trinidad among drivers (67.9%) didn't always obey the speed limit.[23]

Driving at excess or inappropriate speeds, while under the influence of alcohol, while sleepy or fatigued and without protective gear (such as seatbelts, child restraints, and helmets) for all vehicle occupants are major contributors to road crashes, deaths and serious injuries.[24]

Use of seat belt was asked among the vehicle's drivers with seat belt facility except for the Bajaj which had none and the response of the rest were occasionally wearing (42.5%) & never (4%) & on the other hand, Khat and alcohol use while driving was indicated by 17% and 8.5% of the drivers respectively.

This study depicts, the reported causes for the road traffic accident mentioned were human error like a collision with another car, similarly in other studies like human error were the most mentioned cause, Mekele study Malaysian study among adolescents, UAE in sultanate Oman study,[18] Ibadan Nigeria among public drivers,[16]

Abudhabi study,[13] study in south India.[25] Besides this study revealed the perception of all drivers regarding the possible cause of the traffic accident majority of them mentioned a narrow road shared by vehicles, humans & animals which have great implications for the traffic accident.

The multi-variate analysis of this study dictates that the odds of experiencing RTA are 71% less likely among urban dwellers than those living in rural areas. The possible reason might be, in urban areas since the traffic flow is more than the rural, they might get a better insight into managing adversaries.

Vehicles that receive service in the last twelve months are 41% less likely to face RTA than those who didn't. This might be because those who received service might be in better condition than their counterpart.

Driver behavior is one of the main causes that is contributing to the growing road traffic accident incident & it is one picture of the vulnerability stemming from human factors.[26] Participants who report their emotional response as being sometimes aggressive and those who weren't aggressive at all are 60% and 74 % less likely to experience RTA respectively, than those who became aggressive easily.

Drivers who speak to mobile while driving are 1.6 times more likely to experience RTA than those who did not. As mentioned previously, speaking to mobile phones while driving distracts the driver made them prone to an accident.

Road crashes are not evenly distributed throughout the network. They may occur in clusters at single sites, along with particular sections of road, or scattered across whole residential neighborhoods, especially in areas of social deprivation.[19] Those who drive on the straight road are 50 % less likely to experience road traffic accidents than those who drive on the road with bends. As the quality of road affects driving this might be due to the comfort they feel on the road.

Being penalized among vehicle drivers is 1.9 times more likely to encounter RTA than those who didn't. Those who have penalized means indirectly those who are practicing risky driving practice. Therefore, the higher odds among the penalized driver might be attributed to the risky driving experience they had.

Moreover, in this study there is no observed statistical association between road traffic accident & educational status, wearing a seat belt, type of vehicle, driving under the influence of alcohol.

Conclusion

In this study, one-third of the vehicle drivers reported being involved in a road traffic accident in the last one year was which is a public health significance. The most common cause of accidents reported were human errors like a collision with another car and pedestrian crossing the road inappropriately. Risky driving practices such as the use of Khat and shisha as well as speaking to a mobile phone while driving and failing to wear a seat belt were reported. Place of residence, age of respondents, vehicle receiving service in the last twelve months, the personality of the drivers', speaking mobile phone while driving, type of road they always drive on, receive oral warning and penalty were the factors associated with a road traffic accident. Besides, the road was described as narrow which is shared by pedestrians, animals, and all types of vehicles.

Recommendation

The zonal transport agency needs to make a Continuous follow up on vehicle health and risky driving behaviors like mobile speaking, drinking while driving & not wearing a seat belt. Also, provide refreshment training, work on traffic management of the area especially on the proper use of the road as all the users are sharing the same road. Drivers have to strictly adhere to traffic regulations. Pedestrians should respect traffic regulation & take great care while crossing the road.

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Conflicts of interest

The authors declare that there was no conflict of interest.

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