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Prevalence and Associated Factors of Road Traffic Accident Among Taxi Drivers in Bole Sub-City, Addis Ababa, Ethiopia: Cross-Sectional Study

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Abstract

Background: *Globally, 1.3 million people die of road traffic accidents each year, and as many as 50 million get injured. The burden of road causalities and damage is much higher among developing countries like Ethiopia.*
Purpose: This Study aimed to assess the prevalence and associated factors of road traffic accidents among Taxi drivers in the Bole sub-city, Addis Ababa, Ethiopia.

Methods: *A cross-sectional community-based study was conducted among 406 taxi drivers. The data collected from a structured questionnaire was entered using Epi-data version 3.1 and analyzed using SPSS version 20.*

Results: *The prevalence of road traffic accidents is 32.8% among drivers in the Bole sub-city, Addis Ababa. Drivers aged 30-38 years, 40-49 years and 50 years and older have a 74%, 88% and 90% lower risk of being involved in RTA than those younger than 30. Vehicles driven more than 5000 km without undertaking regular service and maintenance are at a 2.6 times higher risk of RTA compared to those driven not more than 3000km. Drivers who add extra passengers have a 9.5 times higher risk of RTA compared to those who don't add extra passengers.*

Conclusion: *The magnitude of sroad traffic accidents is substantially high among younger drivers. Driving more Distance before vehicle service and adding extra passengers are essential contributors to road traffic accidents. We recommend that the Ethiopian road and traffic authorities implement targeted measures to enable a substantial decrease in the prevalence of road traffic accidents.*

Keywords: Road Traffic Accidents, Prevalence, Addis Ababa, Ethiopia

Introduction

Road transport is the most widely used, complex, and dangerous mode of transport because it is highly associated with rising road traffic accidents (RTAs) [1]. A road traffic crash (RTC) is a collision between two or more vehicles, vehicles and pedestrians, vehicles and animals, or vehicles and fixed obstacles [2].

Road Traffic Accident can also be defined as an accident on a way or street open to public traffic, resulting in one or more persons being killed or injured and involving at least one moving vehicle [3]. Currently estimated to be the ninth leading cause of death across all age groups globally and is predicted to become the seventh leading cause of death by 2030 [4].

Road traffic accidents were among the central causes of passing away, hospitalization and disability [5]. Underdeveloped road infrastructures coupled with human factors have a significant role in the occurrence of RTA. Unlike low and middle-income countries, in high-income countries, crashes primarily involve privately owned vehicles, with the driver being the primary car occupant injured or killed. In the United States of America (USA), 60% of the fatalities account for car drivers, while in Ethiopia, 5% account for drivers. This implies that in one crash, the number of people killed or injured in Ethiopia is about 30 times higher than in the USA [6].

Fatality related to road traffic accidents is predicted to increase by 83% in low-income and middle-income countries and to decrease by 27% in high-income countries [6]. In African countries, deaths from road traffic injuries are 40% higher than in all other low and middle-income countries and 50% higher than the world average [7].

Ethiopia has the highest rate of such accidents, resulting in fatalities and various levels of injury. Addis Ababa, the capital city of Ethiopia, takes the lion's share of the risk due to its higher number of vehicles and traffic [1]. Road crashes are increasing, and the government and other stakeholders have given little attention to the issue due to a lack of data on its magnitude and contributing factors from the driver's perspective [8]. Irresponsible behavior of drivers, poor vehicle conditions, failure to apply traffic regulations, reduced road system, and poor road circumstances can contribute to the high prevalence of RTAs in Ethiopia [9]. The Ethiopian National Road Safety Coordination Office cites a road crash fatality rate of 114 deaths per 10,000 vehicles per year. Still, the actual figure may be higher due to an improper reporting system [5].Therefore, this Study aimed to determine the prevalence of RTA and its associated factors among taxi drivers in the Bole sub-city, Addis Ababa. Understanding drivers' perspectives on road traffic accidents can help develop policies and strategies for community-based intervention to reduce road traffic accidents.

Methods and Materials

Study Area and Period

The Study was conducted in the Bole sub-city, Addis Ababa, Ethiopia. Addis Ababa is the capital city of Ethiopia, with an area of 527 km2 and a total population of more than 3 Million. Bole sub-city is located in the southeast part of the city and is a central business district where the international airport and airport cargo terminal are located. Moreover, it is the largest sub-city in Addis Ababa, having 14 woredas (districts) and covering 122.08 sq. km.

This was a community-based cross-sectional study. Data was collected from taxi drivers working at the Bole sub-city from October to December 2023.

Eligibility Criteria

We included all taxi drivers who had driven a taxi for at least one year (12 months) before the data collection period in Addis Ababa, Bole Sub-city and were willing to participate. Taxi drivers who drove a taxi for less than one year (12 months) and those drivers who were not willing to participate in the Study were excluded.

Sample Size Determination

The sample size was calculated with the assumption of proportion (P=0.564 for the prevalence of RTA) based on a previous study report in Adama [10]. By applying the single proportion population formula with a 10% non-response rate, we are presented with a total sample size of 406 drivers.

To determine the sample size for evaluating the associated factors, we will calculate the required sample size using Epi-info for the double population proportion formula. The Calculated Sample sizes were 406, 361, and 114, and finally, the largest sample size was taken for determination.

Sampling Procedure

The study respondents were found from randomly selected woredas in the Bole sub-city then they initially were stratified into three homogeneous groups (Taxi, Lada or Bajaj drivers), and a proportional sample size allocation with systematic random sampling technique was used among the three categories of drivers. The list of the three categories of vehicles in the sub-city was obtained from the respective transport offices of the Bole sub-city taxi and Bajaj associations. Since there are 525 bajaj, 407 Lada and 602 taxi vehicles in the Bole sub-city, the sample size was proportionally allocated to bajaj (139), Lada (108) and Taxi (159), respectively.

Study Variables

The dependent variable for this Study was the prevalence and factors of Road Traffic accidents. The independent variables were socio-demographic factors (gender, age, religion, monthly income, educational and marital status), behavioral factors (Alcohol and khat usage habits, unfastened or loose seatbelt while driving, talking through mobile phones while driving, excessive speeding and driving experience), environmental factors (geographical and weather variations, road surface conditions and driving time of the day) and lastly vehicle factors (ownership status, scheduled maintenance, mechanical failures)

Data Collection Tools and Procedures

The data collection was done using a pretested interviewer-administered questionnaire. The questionnaire was prepared in English, translated to Amharic and then back-translated to English to check for consistency. The data collectors were three nurses and one clinical pharmacist selected based on their previous experience in data collection for research work.

To ensure data quality, data collectors were trained before understanding the research question, sampling technique, data handling, ethical conduct, and quality of data collection. The questionnaire was prepared in English, translated to Amharic and then back-translated to English to check for consistency.

Data Processing and Analysis

Before directly proceeding to data analysis, data was collected and checked for completeness and consistency. Then, it was cleaned, coded, and entered into a computer system using Epi-Data version 3.1, and then it was analyzed using SPSS version 20. Descriptive statistics was used to describe the main features of the variable. Bivariate logistic regression analysis determined the association between independent and dependent variables. Multivariate Logistic regression was used to control

the effect of confounding variables. Multivariable logistic regression analysis included variables having P < 0.2 from bivariate analysis. During multivariable analysis, a P-value of less than 0.05 and an AOR with 95% CI were considered statistically significant for road traffic accidents.

Ethical Considerations

An ethical clearance letter was obtained from the Addis Ababa Public Health and Emergency Management directorate. Permission was obtained from the transport authority. Information on the purpose of the Study and the right not to participate is given to the participants. Written consent was obtained from all the study participants, and the information collected from them was kept confidential.

Results

Socio-Demographic Characteristics

Regarding the types of vehicles, Taxi accounts for 39.2% of the cars, followed by Bajaj (34.2%) and Lada (26.6%). The majority (90.9%) of the drivers were male. Concerning their educational level, 36.5% of the drivers were in secondary school, followed by diploma (20.4%) and primary school (18.2%). About half (50.7%) of the drivers were married, and over a quarter (38.7%) were single.

More than two-thirds (69.7%) of the drivers were followers of the Orthodox religion, followed by Muslims (17.2%) and Protestants (11.6%). The age group is 30-39 (39.9%), followed by 34.0% of those under 30, and finally, 14.8% are between 40 and 50. Most drivers (45.3%) make 1000-1999 Ethiopian birr (ETB) daily.

Taxi Driver and Vehicle-Related Factors

About half (50.2%) of the drivers were taxi owners. About two-thirds (65.0%) of the drivers are equipped with a public-1 license. The Distance traveled before service was less than or equal to 3000 km (45.1%), followed by 3000-5000 km (36.7%) and more than 5000 km (18.2%).

Nearly half of the drivers (45.3%) had extra passengers while driving, out of which 32.8% of the drivers did so to make extra money, while 12.6% mentioned the intention to give extra service to help passengers. The driving duration per day is 8-12 hours (48.3%), followed by less than or equal to 8 hours (26.8%) and 24.9% drive more than 12 hours. Most drivers prefer a speed of at least 50 km/hr in town (65.8%), while 34.2% prefer slower speeds.

Table 1: Taxi driver and vehicle-related factors among drivers in Bole sub-city, Addis Ababa, 2023

Variables	Category	Frequency	Percent
Relationship between the driver and the vehicle	Owner	204	50.2
	Rental	61	15.0
	Recruitment	141	34.7
Have a driving license	Yes	406	100.0
Driving license type	Public-1	264	65.0
	Taxi-1	53	13.1
	Taxi-2	89	21.9
Distance travel before service	≤3000 km	183	45.1
	3000-5000 Km	149	36.7
	>5000 km	74	18.2
Add extra passengers	Yes	184	45.3
	No	222	54.7
Reasons for adding extra passengers	To get money	133	32.8
	To give extra service	51	12.6
Driving hours	≤8 hours	109	26.8
	8-12 hours	196	48.3
	>12 hours	101	24.9
Preferable speed in town	<50 km/hr.	139	34.2
	≥50 km/hr.	267	65.8

Behavioral Factors

Over a third (36.2%) of drivers involved in RTAs admitted to using alcohol before driving. Almost half (44.2%) said they always drank before driving, while 34.7% only sometimes did. Khat use was much less common, with only 7.6% of drivers admitting to chewing it before moving. Most drivers always wore seat belts; only 8.1% said they sometimes did. Mobile phone use while driving was relatively daily, with 66.3% admitting to talking sometimes.

Table 2: Behavioral and related factors among drivers in Bole sub-city, Addis Ababa, 2023

Variable	Category	Frequency	Percent
Alcohol use	Yes	147	36.2
	No	259	63.8
Time of alcohol use	always before driving	65	44.2
	Sometimes before driving	51	34.7
	I drink after driving	31	21.1
Chew khat	Yes	31	7.6
	No	375	92.4
Time of chewing khat	Chew while driving	21	67.7
	After driving, but not while driving	10	32.3
Seat belt use	Always	373	91.9
	Sometimes	33	8.1
Talking through mobile	Sometimes	269	66.3
	Never	137	33.7

Environmental Characteristics

Most RTAs occurred on downhill roads (43.6%), followed by regular and curved roads (23.3% each). The predominant road surface was asphalt in good condition (61.7%), with some in poor condition (19.5%). Most incidents happened on dry roads (61.7%), with some on wet (23.3%) and a few on muddy/coarse roads (3.8%). Daytime saw the most incidents (39.1%), followed by night with working lights (23.3%) and night without lights (22.6%). Good weather prevailed during most RTAs (38.3%), with some in fog/cloud (12.8%) and rain (33.8%). Weekdays had more incidents (57.9%) than weekends (27.1%). About 23.3% of RTAs resulted in death, while physical injuries were common, with 50.4% being minor and 34.6% being significant. Property damage occurred in almost half of the incidents (46.6%).

Table 3: Physical environment factors and consequences of the RTA in Bole sub-city, Addis Ababa, 2023

Variables	Category	Frequency	Percent
Roads geographical state	Curved	24	18.0
	Downhill	58	43.6
	Normal	31	23.3
Road surface type	Asphalt in good condition	82	61.7
	Asphalt in poor condition	26	19.5
	Coarse	5	3.8
State of road	Dry	82	61.7
	Wet	31	23.3
Time of RTA	Day time	52	39.1
	A night with Road light on	31	23.3
	Night without Road light	30	22.6
Climate during RTA	Good weather	51	38.3
	Foggy/cloudy	17	12.8
	Rainy	45	33.8
Day of RTA	Weekday	77	57.9
	Weekend day	36	27.1
Death occurred RTA	Yes	31	23.3
	No	82	61.7
Physical injury	Simple physical injury	67	50.4
	Heavy physical injury	46	34.6
Property damage	Yes	62	46.6
	No	51	38.3

Prevalence of Road Traffic Accident

The prevalence of road traffic accidents in the last one-year period among taxi drivers in this Study was (32.8%) with a 95% CI (28.2%-37.6%). When we look at the magnitude of road traffic accidents among the different types of vehicles, we see that it is 32.4% among Ladas, 33.1% among Bajajs, and 32.7% among taxis.

Reasons of the Driver for a Road Traffic Accident

More than one-third (36.1%) of taxi drivers said ignoring traffic rules was the reason for road traffic accidents, followed by fatigue (25.6%) and distractions (23.3%). Roundabouts and recreation areas were the frequent locations for RTAs, at 23.3%. Nearly half (46.6%) of RTAs involved no mechanical defects. Brake problems were the most common issue (18.0%), followed by steering system malfunctions (15.0%) and tire-related problems (9.0%).

Factors Associated to RTA

In bivariate logistic regression analysis, male sex, low educational levels, single marital status, younger ages, higher Distance traveled before service, adding extra passengers and preferred speed of 50 km/hr. Showed statistically significant association with P-value < 0.2.

Multivariable logistic regression was used to statistically adjust the estimated effects of each variable in the model. The variables sex, age, educational status, marital status, Distance traveled before service and adding extra passengers into the vehicle were included in the final multivariable logistic regression model.

Although sex, educational level and marital status were significantly associated with road traffic accidents in the bivariate regression, their association disappeared in the final model. The variables age, Distance traveled before service and adding extra passengers were found to be significantly associated with RTA.

Drivers with ages of 30-39 years, 40-49 years and 50 years and older old have a 26%, 88% and 90% lower risk of being involved in an RTA compared to those who are younger than 30 years (AOR = 0.26, 95% CI: 0.07-0.96, P-value = 0.042); (AOR = 0.12, 95% CI: 0.04-0.38, P-value < 0.001), and (AOR = 0.10, 95% CI: 0.03-0.30, P-value < 0.001) respectively.

Vehicles driven more than 5000 km before service are at a 2.6 times higher risk of RTA than those driven not more than 3000 km. (AOR = 2.55, 95% CI: 1.14-5.74, P-value = 0.023).

Drivers who add extra passengers have a 9.5 times higher risk of RTA than those who don't (AOR = 9.5, 95% CI: 5.14-17.56, P-value < 0.001).

Discussion

This Study found that the prevalence of road traffic accidents is 32.8% among drivers in the Bole sub-city, Addis Ababa. Drivers with older ages have a lower risk of being involved in an RTA compared to those who are younger than 30 years. This is consistent with the finding of research on the magnitude of road traffic accident-related injuries and fatalities in Ethiopia, which found that younger adults (15-29) accounted for 47.1% of all RTA casualties, while seniors (over 64) represented only 15.3% (44). As drivers get older, they become experienced, leading them to have improved skills, hazard perception, and decision-making in their travel, which reduces the likelihood of errors and risky behaviors significantly. The other reason could be that younger drivers may drive more frequently, and their higher risk-taking tendencies, such as speeding, aggressive driving, and impaired driving, increase their overall exposure to potential accidents, unlike older drivers (46).

Vehicles driven more kilometers before service were found to be at a 2.6 times higher risk of RTA than those who service their cars more frequently. This is supported by a study conducted in Northwest Ethiopia, which states that deaths due to car accidents decreased by 0.90 times when the vehicle service was increased by a single year (47). The possible explanation might be that regular servicing ensures timely identification and replacement of worn-out parts like brakes, tires, and suspension components.

Drivers who add extra passengers have a 9.5 times higher risk of RTA compared to those who don't add extra passengers. This finding aligns with a systematic review of 17 studies that analyze studies on young driver crashes and passenger influence, which found that the risk of crashes for drivers increased by 2.92 times while driving with two or more passengers (47). The possible explanation for this could be that exceeding the designated capacity of the vehicle can impact its handling and braking performance, especially in emergencies. This is particularly concerning with overloaded taxis or informal transportation services.

Conclusions and Recommendations

The findings of this Study revealed that the magnitude of road traffic accidents is substantially high among drivers in the Bole sub-city, Addis Ababa, Ethiopia. Younger ages, more Distance traveled before service, and adding extra passengers into a vehicle are essential contributors to road traffic accidents.

Based on the findings of this Study, we forward the following recommendations for the Ethiopian road and traffic authority: To enforce Stricter enforcement and awareness creation activities regarding passenger limits and facilitate regular vehicle inspections and maintenance programs to ensure vehicles meet safety standards, particularly brakes, tires, and lighting systems. We also suggest that fellow researchers conduct further qualitative studies addressing drivers' behavior, knowledge, attitude, and practice regarding the existing traffic laws that increase the likelihood of exposure to road traffic accidents.

Limitations of the Study

Since the Study captures data at a single point, it limits the ability to understand changes over time or the sequence of events leading up to an RTA. There may also be recall and social desirability bias, as the study participants might need to recall past events accurately, such as their involvement in RTAs or driving behavior, which may lead to inaccurate data. They may also be inclined to answer questions in a way they perceive as socially desirable, potentially affecting the validity of the collected data.

Authors' Contributions

All authors have approved the final version of the manuscript.

- M.K.-Participated in preparing and analyzing the research proposal and writing the data manuscript. He is the corresponding author of the article.
- S.T.-Wrote the proposal, collected data, analyzed it, and wrote the manuscript.
- K.K.-Participated substantially in the manuscript's conception, design, and writing; he also reviewed and corrected the entire article before submission.
- D.R.-Contributed substantially to the conception, design and writing of the transcript.
- T.T.-Contributed substantially to the conception, design and writing of the transcript.
- A.Z.-Contributed substantially to the conception, design and writing of the transcript.
- N.W.-Involved in the training and coordination of data collectors.

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