Road Traffic Accidents Fatality and Associated Factors in Southwest Shoa, Central Ethiopia

Dagne Kebede Geleta[1], Hassen Abdi Adem[2*], Fekede Asefa Kumsa[2, 3], Melake Demena[2], Tesfaye Gobena[4]

[1]Southwest Shoa Health Office, Wolliso, Ethiopia
[2]School of Public Health, College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia
[3]Centre for Midwifery, Child and Family Health, Faculty of Health, University of Technology Sydney, NSW, Australia
[4]Department of Environmental Health, College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia

Abstract

Background: Road traffic accident is one of many public health problems which cause over 1.24 million deaths and 50 million injuries every year globally. Ethiopia is one of the countries with the highest burden and alarmingly raising trends of road traffic accidents. However, there was little information in Ethiopia on the fatality and risk factors of road traffic accidents especially prior to healthcare facilities arrival. This study assessed road traffic accidents fatality and associated factors in Southwest Shoa in Ethiopia.

Methods: A cross-sectional study was conducted on 2046 registered road traffic accidents in seven police stations on the road connecting Alemgena and Woliso towns in central Ethiopia from January 01, 2010 to December 31, 2016. Data were analyzed by Statistical Package for Social Science version 24 using descriptive statistics, bivariable and multivariable logistic regression analyses. P-value<0.05 at 95% confidence interval was used statistical significance.

Results: In this study, the overall road traffic accidents fatality was 26.7% (95% CI: 24.7, 28.8). It killed 658 peoples (469 pedestrians, 152 passengers and 37 drivers). Rainy weather (AOR=1.77; 95% CI: 1.22, 2.56), lack of driving license (AOR=2.49; 95% CI: 1.20, 5.16), night (AOR=1.30; 95% CI: 1.02, 1.67), speeding (AOR=4.25; 95% CI: 1.96, 9.22), failure to give priority to pedestrians/ vehicles (AOR=2.96; 95% CI: 1.35, 6.48), pedestrians' error (AOR=3.83, 95% CI: 1.80, 10.84) and vehicle's technical problem (AOR=3.1; 95% CI: 1.22, 7.87) increased the odds of road traffic accidents fatality.

Conclusion: More than a quarter of the road traffic accidents caused loss of life. Rainy weather, night-travel, driver without license, speeding, failure to give priorities to pedestrians/vehicles, pedestrian errors and vehicle's technical problem were factors significantly associated with road traffic accidents fatality. Therefore, strengthening public awareness creation campaigns and applying more efforts on implementing currently existing road safety rules such as following speeding, licensing, giving priorities to pedestrians/vehicles and technical check-up of vehicles would be essential.

Keywords: *Associated Factors; Fatality; Ethiopia; Road Traffic Accidents; Southwest Shoa*

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Introduction

Road traffic accident (RTA) is an accident between moving vehicle/bicycle and another vehicles, pedestrians, animals, architectural obstacles, which occurs on a way to public traffic (Persson, 2008). About 100,000 peoples injured and 3,247 peoples die every day globally due to RTAs (WHO, 2013a). It is the first leading cause of death for the age of 15 to 29 years; the third leading cause of death for the age of 30 to 44 years (WHO, 2015) and the first leading cause of death for the age of 5 to 29 years in the world (WHO, 2018). Globally, it ranked as the ninth leading causes of disability and death in 2013. It is predicted to be the fifth leading cause of death by 2030 (WHO, 2013a). More than 90% of deaths on the world's roads occur in low and middle-income countries (LMIC) (WHO, 2013a). The fatality rate is radially increasing (Siaw *et al.*, 2014; WHO, 2018). The fatality rate per 100,000 population was 21.5 in 2013 and 27.5 in 2016 in LMIC while it was 9.5 in 2013 and 8.5 in 2016 in high-income countries (WHO, 2018).

*Corresponding Author; Email: hassenxiqqa32@gmail.com
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Africa suffers the highest burden and increasing trend of RTAs death (Bhalla, 2013). The RTAs fatality rate per 100,000 population was 26.1 in 2013 and it was 26.6 in 2016 (WHO, 2018). In 2010, RTAs killed 231,000 people in Sub-Sahara Africa (SSA) accounting one-fifth of the global road traffic death tolls and half of these deaths occurred in Nigeria, South Africa, Sudan and Ethiopia (Bhalla, 2013); trend of RTAs death is more worsening in SSA (Siaw *et al.*, 2014; WHO, 2018).

Ethiopia is one of the countries with the highest burden and alarmingly increasing trends of the RTAs deaths and injuries (Asefa *et al.*, 2014;Woldeyohannes and Moges, 2014; WHO, 2015; Fenta *et al.*, 2017; Bhalla, 2013). The severity of the RTAs in Ethiopia varies across the regions where 66.6% of injuries and 36% of deaths related to RTAs were reported from Oromia Regional State (Hunde and Agede, 2015).

Globally, the most dying group in the RTAs are motorcyclists (23%) and pedestrians (22%) (Tulu *et al*., 2013; Zewude and Ashine, 2016). In LMIC, pedestrians and two wheelers have higher risk of RTAs fatality (Nantulya and Reich, 2009). In Africa, pedestrian's and cyclist's deaths account for 43% of the RTAs death (Tulu *et al*., 2013). In SSA, RTAs killed drivers (38%), passengers (35%) and pedestrians (26%) (Boniface *et al.*, 2016). In Ethiopia, pedestrians (53.4%) and passengers (39.2%) accounts for 92.6% of RTA deaths (Zewude and Ashine, 2016). In central Ethiopia, it resulted in death of 60% pedestrians, passengers (28%) and drivers (12%) (Asefa *et al*., 2014). In another study on RTAs on the roads which extends from Addis Ababa to Adama then Hawassa, resulted in death of pedestrians (48%) ,passengers(32%) and driver(11%) (Abegaz *et al*., 2014).

The road traffic accidents deaths and injuries targeted the most productive age cohort especially the younger male, still doubling the hardships to the family members, communities, the nation and globe at large (Asefa *et al*., 2014; Ngallaba *et al*., 2014; Fenta *et al*., 2017).

Different factors were identified to be associated with RTAs deaths and injuries which include human (drivers and pedestrians), vehicles and environment related factors (Malaya and Ankit, 2015; WHO, 2018). Nearly three-fourth of RTAs death occurs due to poor human behaviours such as high speed driving, failing to give priority to pedestrians or other vehicles, following vehicle too closely, vehicular defect, mobile-phoning while driving and pedestrians' errors (Qirjako *et al.*, 2008; Aljanahi *et al.*, 2009; Getu *et al.*, 2013; Asefa *et al.*, 2014; Çelik and Senger, 2014; Ojo, 2015; Boniface *et al.*, 2016). Alcohol and drug abuse, bad roads, drivers and pedestrians negligence, vehicles' overload and poor maintenance affect RTA deaths and injuries (WHO, 2018).

Most previous studies were conducted in health facilities in urban setting, which assessed levels and severity of the RTAs with special emphasis on the health outcome of affected victims after arrival to healthcare facilities (Qirjako *et al.*, 2008; Osoro, 2011; Hunde and Agede, 2015; Getachew *et al.*, 2016; Zewude and Ashine, 2016; Misker *et al.*, 2017). Identifying the risk factors and fatality of RTAs in the local context has paramount role in reducing the burdens and impacts of the problem. However, the road traffic accidents happening on the road continued being huge public health problems accounting for many life losses, injuries and disabilities, and property damages (Woldeyohannes and Moges, 2014). Therefore, this study assessed fatality and risk factors for road traffic accidents in Southwest Shoa in central Ethiopia.

Materials and Methods

Study design, setting, and period

A retrospective study was conducted on all registered RTAs from January 01, 2010 to December 31, 2016 on seven police stations (Walate, Alemgena, Sebeta, Teji, Tulubolo, Woliso rural and Woliso urban) on the road between Alemgena and Woliso towns in Southwest Shoa, central Ethiopia, from February 25 to April 10, 2017. This 110 kilometres primary asphalt road with 21 routes connects the capital city, Ethiopia (Addis Ababa) with the western and southwestern parts of the country.

Sample size and sampling technique

All 2046 RTCs registers in seven police stations from January 01, 2010 to December 31, 2016, which had recorded with complete information on RTC, were included in this study.

Data collection method

Data were collected by 12 trained police officers (two per a station) using structured questionnaire which was adopted from national daily RTAs registrations of police station. The tool contains several information about RTAs such as sociodemographic related factors (age, sex and educational status of driver, place and year of the crashes), driver's behaviour related factors (level of driving license, driving experience, reasons for the crashes occurrence such as speeding, careless driving, failure to give priorities to pedestrians or other vehicles, following vehicles too closely), vehicles related factors (type and technical problem of the vehicles) and environment's related factors (weather and light condition at the time of the crashes occurrence) and type of the RTAs (fatal injury, severe injury, slight injury and property damage injury).

Definition of terms

Careless driving: is unsafe (risky) driving behaviour in which drivers do not keep their eyes on the road or their hands on the wheel or their minds on the task of driving or those drivers who use mobile phone or substances (chat or cigarettes or alcohols) that can potentially affect any or all of these aspects of driver's behaviour (Abrahim *et al*., 2011; WHO, 2011).

Fatal injury*:* is RTA that resulted in the death of at least one person (driver or pedestrian or passenger) within a month after the crash occurrence (WHO, 2004).

Non-fatal injury*:* is RTA that resulted in either "property damage injury" or "slight injury" or "severe injury" but "not death" or "fatal injury" within a month after the crash occurrence (WHO, 2004).

Property damage injury**:** is RTA in which no person is injured but only one or more vehicles involved in the crashes are damaged (WHO, 2004).

Slight injury: is RTA that resulted in the requirement of medical care or treatment but not hospitalization (admission at health facility) (WHO, 2004).

Severe injury: is RTA that resulted in hospitalization but no death (WHO, 2004).

Speeding**:** is driving a vehicle at above 40 kilometres per hour in the town/city and over 80 kilometres per hour outside the town or city (WHO, 2008).

Data quality control

Data collection tool was initially prepared in English language and translated to Afaan Oromoo (local language). Data collectors and supervisors were trained for two days on data collection tool and procedure, and proper handling of the RTAs data. The overall field work was supervised by expert having first degree in public health. At the end of each day, filled questionnaire was checked for incompleteness and inconsistency of the data and findings based corrective measures were immediately taken in the field.

Data processing and analysis

Data were entered into EpiData version 3.1 and edited, recoded, cleaned and exported to SPSS version 24 software for further analysis. It was analysed using descriptive statistics; frequency and percentage for categorical variables; mean and standard deviation for symmetric continuous variables; and median and inter-quartile range for asymmetric continuous variables. Chi-square test for linear trend was used to determine trends of RTAs fatality and injuries. Bivariable and multivariable logistic regression analyses were used to identify factors associated with RTAs fatality. The model fitness was tested by Hosmer and Lemeshow goodness of fit test. Variables with P-value <0.25 in bivariable analysis were considered for multivariable analysis. Variables with P-value<0.05 at 95% confidence interval (CI) were considered as significant risk factors for the RTAs fatality.

Ethical consideration

Ethical clearance was obtained from Institutional Health Research Ethical Review Committee of College of Health and Medical Science, Haramaya University on Feb.14/2017 with Ref.no. IHRERC/087/2017. Official letter of cooperation was written by Haramaya University College of Health and Medical Science to Southwest Shoa zone Sebeta Hawas district police offices and corresponding police station. Informed written consent was obtained from the head of each police station.

Results

Sociodemographic characteristics of drivers

A total of 2046 RTAs had been recorded in the study area from January 01, 2010 to December 31, 2016. The mean age (±SD) of drivers were 32.3±9.2 years which is ranging from 12 years to 68 years. Drivers having

age ranged from 12 to 30 years old were responsible for more than fifty percent (54.5%) of road traffic accidents. Almost all, 2025 (99%) RTAs occurred by male drivers. Ninety (4.4%) drivers had no driving license. The median time of driving experience was 4 years with interquartile range of 6 years (quartile 1=2, quartile 3=8) (Table 1).

Table 1: Characteristics of drivers involved RTAs from 2010-2016 on the road between Alemgena and Woliso towns in Southwest Shoa, Central Ethiopia

Variables		Frequency	Percent (%)
Age category (in year)	≤ 18	38	1.8
	19-30	1116	54.5
	31-50	795	39.0
	>50	97	4.7
Sex of driver	Male	2025	99.0
	Female	21	1.0
Driving experience category (in years)	<1	447	21.8
	1 to 2	224	10.9
	3 to 5	513	25.1
	6 to 10	482	23.6
	>10	380	18.6
Level of driving license	No driving license	90	4.4
	1st level	73	3.6
	2nd level	329	16.1
	3rd level	1068	52.2
	4th level	275	13.4
	5th level and above	211	10.3
Place of the RTAs	Woliso	463	22.6
	Tulubolo	235	11.5
	Teji	109	5.3
	Sebeta	357	17.4
	Alemgena	882	43.1

RTA=Road Traffic Accidents

Trends of RTAs

Magnitude of RTAs fatality was increased from 60 (26.1%) in 2010 to 112 (32.3%) in 2016. The overall Magnitude of fatal RTAs was increased from 60 (26.1%) in 2010 to 112 (32.3%) in 2016. The overall magnitude of non-fatal RTAs was increased from 170 (73.9%) in 2010 to 283 (77.1%) in 2015 despite a little decreasing, 235(67.7%) in 2016 ($\chi 2$ test for trend=0.05620, p-value=0.8126). Similarly, the trends of severe and slight injuries were increased from 59 (34.7%) and 33 (19.4%) in 2010 to 97 (41.3%) and 68 (28.9%) in 2016, respectively while the magnitude of property damage injury was decreased from 78 (45.9%) in 2010 to 70 (29.9%) in 2016 (Figure 1).

Characteristics of RTAs

Majority of RTAs, 1437 (71.1%) were occurred during the day time and not due to technical problem, 1960 (95.8%). Nine hundred ninety seven (49.5%) RTCs occurred due collision with pedestrians and 539 (26.7%) due to a collision with other vehicles. Eight hundred twenty (40.0%) of RTAs occurred due to driver's carelessness. Most of the RTCs are occurred by public services/transportation 718 (35.1%) and commercial trucks 655 (32%) (Table 2).

Road Traffic accident fatality

In this study, 26.7% (95% CI: 24.8, 28.6) RTAs were fatal crashes which killed 658 peoples.The remaining 73.3% of the crashes were non-fatal injury, of which 502 (24.5%) were severe injury, 430 (21.1%) were slight injury and 568 (27.7%) were property damage injury, respectively (Figure 1).

Regarding the victims of the crashes, a total of 2741 peoples were affected by RTAs (658 (24%) deaths and 2083 (76%) injuries). The majority, 469 (71.3%) of the killed victims were pedestrians while nearly half, (46%) of RTAs survivors were passengers (Figure 2).

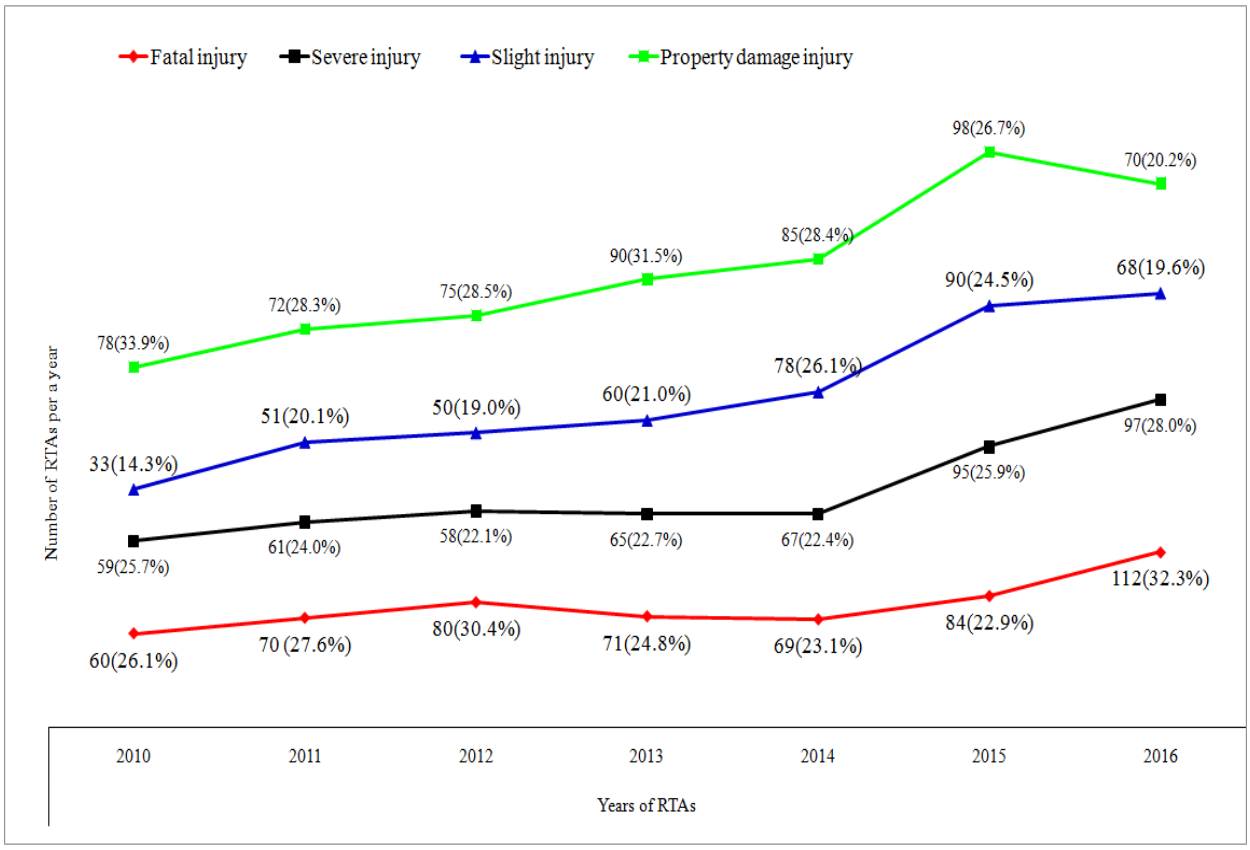

Figure 1: Figure 1: Trends of road traffic accidents from 2010-2016 on the road between Alemgena and Woliso towns in Southwest Shoa, Central Ethiopia

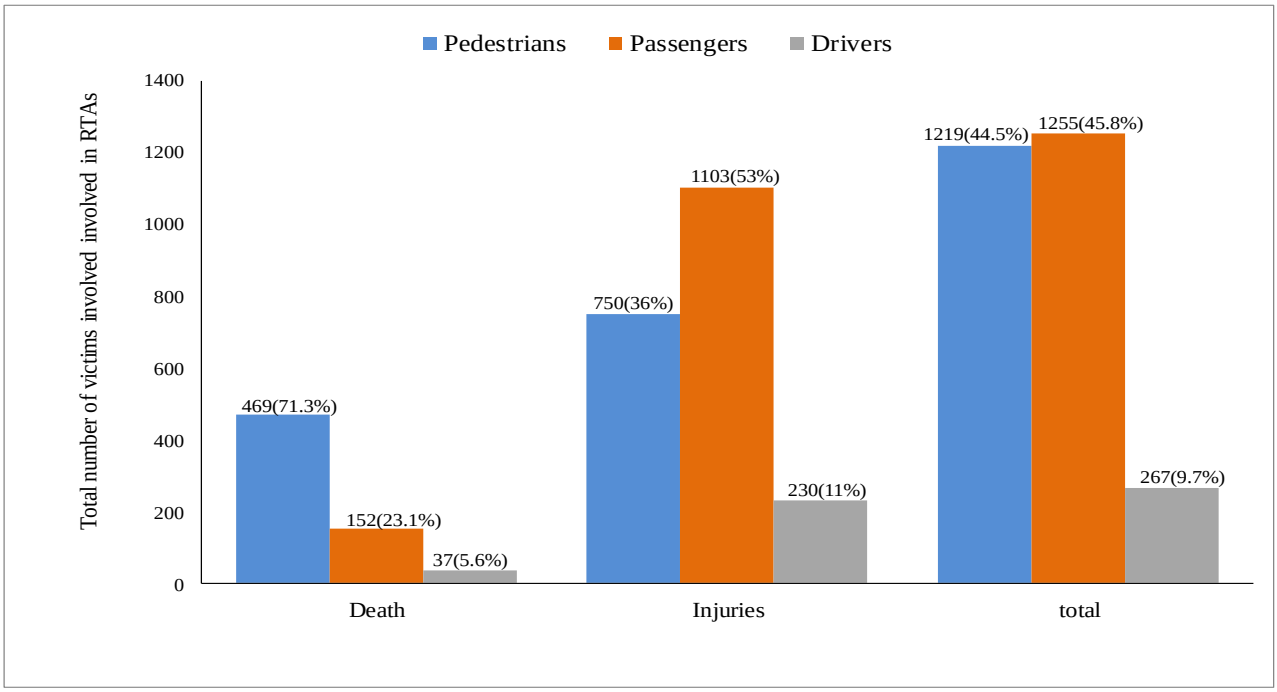

Figure 2: Road traffic accident victims by road users from 2010-2016 on the road between Alemgena and Woliso towns in Southwest Shoa, Central Ethiopia

Table 2: Characteristics of road traffic accidents from 2010-2016 on the road between Alemgena and Woliso towns in Southwest Shoa, Central Ethiopia

Variables		Frequency	Percent
Week day of the RTAs	Monday	283	13.8
	Tuesday	297	14.5
	Wednesday	289	14.1
	Thursday	252	12.3
	Friday	294	14.4
	Saturday	338	16.5
	Sunday	293	14.3
Time of the RTAs (in hours: minutes)	00:00-05.59	538	26.3
	06:00-11.59	786	38.4
	12:00-17.59	590	28.8
	18:00-23:59	132	6.5
At which time RTA occurred?	Day	1440	70.4
	Night	606	29.6
Weather condition	Rainy	160	7.8
	Non-rainy	1886	92.2
Type of the RTAs	Crash with other vehicle	539	26.3
	Crash with pedestrians	997	48.7
	Rollover crash	433	21.2
	Crash with animal/other structure	77	3.8
Reasons for RTAs occurrence	Careless driving	820	40.1
	Speeding	532	26.0
	Failure to give priority	388	19.0
	Pedestrians' error	28	1.4
	Vehicle defect	80	3.9
	Unskilled driver	45	2.2
	Following too closely	95	4.6
	Others*a	58	2.8
Type of the Vehicles	Two to three wheelers	146	7.1
	Public transportation	718	35.1
	Commercial trucks	655	32.0
	Automobiles	429	21.0
	Others*b	98	4.8
Vehicle's defect	Yes	86	4.2
	No	1960	95.8

*RTA=Road traffic accidents; *a= drunk driving, deliberate violation of traffic light, road problem, and unidentified reason *b= Bajaj, Motorcycle, Ambulance Pick up, Lorry and Toyota*

Factors associated with RTAs fatality

In bivariable analysis, driving experience, no driving license, place of RTAs, rainy weather condition, night time, careless driving, speeding, failure to give priorities to pedestrians or other vehicles, pedestrians error, technical problems of the vehicles, unskilled drivers and public transportation vehicles had significant association with the RTAs fatality at p-value <0.05. In multivariable analysis, the odds of RTAs fatality was 2.49 times more likely to occur in drivers who did not have driving license when compared to drivers who had level 5 driving license (AOR=2.49; 95% CI: 1.20, 5.16). The odds of RTAs fatality was 45% less likely to occur in Wolliso town (AOR=0.55; 95% CI: 0.32, 0.96) and 51% less likely to occur in Alemgena town (AOR=0.49; 95% CI: 0.31, 0.77) compared to Teji town, respectively. The odds of RTAs fatality was almost 2 times more likely to occur during the

rainy weather than non-rainy (dry/cloudy) weather condition (AOR=1.77; 95% CI: 1.22, 2.56). The odds of RTAs fatality was 1.3 times more likely to occur when in the night time (AOR=1.30; 95% CI: 1.02, 1.67) compared to the day time.

The odds of RTAs fatality was 4.25 times more likely to occur when speeding (AOR=4.25; 95% CI: 1.96, 9.22), 2.25 times more likely to occur when carelessly driving (AOR=2.25; 95% CI: 1.05, 4.83), 3.10 times more likely to when the vehicles had technical problem (AOR=3.10; 95% CI 1.22, 7.87), 2.96 times more likely to occur when failed to give priorities to pedestrians or other vehicles (AOR=2.96, 95% CI: 1.35, 6.48) and 3.68 times more likely to occur when drivers had the skill gaps (AOR=3.68; 95% CI: 1.28, 10.54) compared to when following vehicles too closely.

The odds of RTAs fatality was 1.47 times more likely to occur when travel by public transportation vehicle (AOR=1.47; 95% CI: 1.07, 2.02) compared to Automobile. The odds of RTAs fatality was 1.67 times more likely to occur in 2016 compared to 2010 (AOR=1.67; 95% CI: 1.06, 2.65) (Table 3).

Discussion

In this study, more than a quarter of the RTAs causes fatality. No driving license, place of RTAs, rainy weather condition, night time, careless driving, speeding, failure to give priorities to pedestrians or other vehicles, pedestrians error, technical problems of the vehicles, unskilled drivers, type of the vehicles and year of RTAs were significant predictors of RTAs fatality in the study area.

In this study, the RTAs fatality of 26.7% was found, which is slightly lower than the fatality reported in a study conducted in central Ethiopia (29.4%) (Abegaz *et al*., 2014). However, the fatality found in this study is higher than the national RTAs fatality of Ethiopia (22%) (Getu *et al*., 2013) and the findings of studies conducted in Addis Ababa (12%) (Almaz *et al*., 2014) and central Ethiopia (16.7%) (Asefa *et al*., 2014), Kenya (17.1%) (Osoro *et al.,* 2015) and Albania (17%) (Qirjako *et al*., 2008). This difference could be explained by differences in geographic location, study period, driving licensing procedure, road quality, practice of enforcing traffic laws and socio-economic status, severity accident, lifesaving procedures and other. For instance, study conducted in Ethiopia initiated limited or lack of access to life saving pre-hospital first aid services; limited ambulance delivery services or lack of quick transportation system in health facility to prevent loss of lives before arrival to facility; and limited equipment and qualified person in the health facilities were reported for increasing RTA fatalities (Getachew *et al*., 2016).

In this study, driver without driving license increased the RTAs fatality. This finding is supported by studies conducted in Iran (Pakgohar *et al.,* 2011) and Thailand (Kulchamorin and Pattaphongse, 2018).

The lower odds of RTAs fatality were seen in Alemgena and Woliso towns although the higher magnitudes of RTAs were reported in these towns compared to their counterpart. This finding could be explained by the fact that both Alemgena and Woliso towns are the highly business areas with relatively higher population and motor vehicles sizes. Hence, driver can apply maximum care and also less likely speeding vehicle in those areas (Tulu *et al*., 2013).

The odds of RTAs fatality occurred during rainy or foggy weather condition was higher than in dry (non-rainy) weather condition. Similar findings were reported from studies conducted in Arba Minch, southern Ethiopia (Misker *et al*., 2017), Kenya (Osoro, 2011) and Turkey (Çelik and Senger, 2014). This might be due to slippery condition of the road, tyre quality/conduction, and technical problem of car or decreased visibility during rainy time.

This study revealed the RTAs fatality at night time was higher than at day time. This is consistent with studies conducted in central Ethiopia (Asefa *et al.*, 2014), south Ethiopia (Zewude and Ashine, 2016) and Kenya (Osoro, 2011). This could be explained by poor visibility in the absence of street light, car light, driver sleep and lack of traffic police supervision at night, especially after 7:00 pm.

The RTAs fatality was two folds higher when carelessly driving and this is supported by finding from studies conducted in central (Asefa *et al*., 2014) and northern Ethiopia (Mekonnen and Teshager, 2014).

Table 3: Table 3: Factors associated with RTAs fatality from 2010-2016 on the road between Alemgena and Woliso towns in Southwest Shoa, Central Ethiopia

Associated factors		Fatal RTAs (%)	Non-fatal RTAs (%)	COR (95% CI)	AOR (95% CI)
Driving experience in year	<1	106(23.7)	341(76.3)	1.18(0.85, 1.65)	1.02(0.58, 1.76)
	1 to 2	68(30.4)	156(69.6)	1.66(1.14, 2.42)**	1.17(0.77, 1.77)
	3 to 5	155(30.2)	358(69.8)	1.65(1.21, 2.52)**	1.51(0.99, 2.24)
	6 to10	138(28.6)	344(71.4)	1.53(1.03, 2.02)**	1.38(0.92, 2.01)
	>10	79(20.8)	301(79.2)	1	1
Level of driving license	No license	32(35.6)	58(64.4)	2.31(1.18, 3.50)*	2.49(1.20,5.16)*
	1st level	17(23.3)	56(76.7)	1.12(0.59, 2.13)	1.47(0.66, 3.27)
	2nd level	76(23.1)	253(76.9)	1.11(0.73, 1.68)	0.93(0.55, 1.58)
	3rd level	306(28.7)	762(71.3)	1.48(1.04, 2.11)*	1.07(0.69, 1.67)
	4th level	70(25.5)	205(74.5)	1.26(0.82, 1.93)	0.98(0.59, 1.63)
	≥ 5th level	45(21.3)	166(78.7)	1	1
Place of the RTAs	Woliso	124(26.8)	339(73.2)	0.56(0.36, 0.87)**	0.55(0.32, 0.96)*
	Tulu-bolo	65(27.7)	170(72.3)	0.59(0.36, 0.95)*	0.63(0.35, 1.13)
	Sebeta	112(31.4)	245(68.6)	0.70(0.45, 1.09)	0.72(0.44, 1.18)
	Alemgena	202(22.9)	680(77.1)	0.46(0.30, 0.69)**	0.49(0.31, 0.77)**
	Teji	43(39.4)	66(60.6)	1	1
Weather condition	Rainy	62(38.8)	98(61.2)	1.83(1.31, 2.56)**	1.77(1.22, 2.56)**
	Non-rainy	484(25.7)	1402(74.3)	1	1
At which time RTA occurred?	Night	185(31.9)	395(68.1)	1.43(1.16, 1.77)**	1.30(1.02, 1.67)*
	Day	361(17.6)	1105(72.4)	1	1
Reasons for RTAs	Careless driving	190(23.2)	630(76.8)	2.88(1.42, 5.84)**	2.25(1.05, 4.83)*
	Speeding	185(34.8)	347(65.2)	5.09(2.51,10.36)**	4.25(1.96, 9.22)**
	Failure to give priority	106(27.3)	282(72.7)	3.59(1.75,7.39)**	2.96(1.35, 6.48)**
	Pedestrians' error	9(32.1)	19(67.9)	4.53(1.58,12.92)**	3.83(1.80, 10.84)**
	Vehicle's defect	21(26.3)	59(73.7)	3.40(1.46,7.94)**	3.10(1.22, 7.87)*
	Unskilled driver	12(26.7)	33(73.3)	3.47(1.34,9.01)**	3.68(1.28, 10.54)*
	Others†a	14(24.1)	44(75.9)	3.04(1.22, 7.54)*	2.87(1.01, 7.94)*
	Follow too closely	9(9.5)	86(90.5)	1	1
Type of the vehicles	Two and three wheelers	29(19.9)	117(80.1)	0.82(0.51, 1.13)	0.96(0.57, 1.63)
	Public transportation	223(31.1)	495(68.9)	1.48(1.13,1.95)**	1.47(1.07, 2.02)*
	Commercial trucks	172(26.3)	483(73.7)	1.17(0.89, 1.55)	1.12(0.81, 1.55)
	Others†b	26(26.5)	72(73.5)	0.95(0.54, 1.65)	1.22(0.64, 2.33)
	Automobile	96(22.4)	333(77.6)	1	1
Year of the RTAs	2010	60(26.1)	170(73.9)	1	1
	2011	70(27.6)	184(72.4)	1.08(0.72, 1.61)	0.90(0.55, 1.48)
	2012	80(30.4)	183(69.6)	1.24(0.84, 1.84)	1.21(0.76, 1.94)
	2013	71(24.8)	215(75.2)	0.94(0.63, 1.39)	0.92(0.58, 1.47)
	2014	69(23.1)	230(76.9)	0.85(0.57, 1.27)	0.99(0.62, 1.59)
	2015	84(22.9)	283(77.1)	0.84(0.57, 1.23)	0.85(0.53, 1.37)
	2016	112(32.3)	235(67.7)	1.35(0.93, 1.96)	1.67(1.06, 2.65)*

*RTA=Road Traffic Accidents; **P≤0.01, *P<0.05; COR=Crude Odds Ratio, AOR=Adjusted Odds Ratio; CI=Confidence interval; †a=drunk driving, deliberate violation of traffic light, roads problem, and unidentified reason; †b=Bajaj, Motorcycle, Ambulance Pick up, Lorry and* Toyota

Failing to give priority for pedestrians or other vehicles in combination with high speed drive increases the odds of RTAs fatality. This finding agrees with the findings of studies conducted in central (Asefa *et al.*, 2014), and northern Ethiopia (Asefa *et al*., 2015), Nigeria (Ojo, 2015) and Albania (Qirjako *et al.*, 2008). This could be explained as the faster a car driver speed, the less time s/he has to react to situations and increase accident. Even a little force applied on the human body can increase the speed more and hence might increases the occurrences of RTAs and fatality.

In this study, pedestrians' error increased RTA fatality. This finding is higher than the finding of study done in central Ethiopia (Abegaz *et al*., 2014). This variation could be explained by differences in geographic location, the study period, absence of sidewalk roads for pedestrians, failure to give priority to pedestrians and poor road using behaviour of pedestrians (Abegaz *et al*., 2014).

Vehicles that had technical problem can increase the likelihood of RTAs fatality. This is consistent with findings from studies conducted in central Ethiopia (Asefa *et al.*, 2014), northern Ethiopia (Asefa *et al*., 2015) and Kenya (Osoro *et al*., 2015). This might be due to lack of continuous or regular technical check-up of the vehicle. In Ethiopia yearly check-up requested by government for renewal of car/driving.

In this study, unskilled drivers increased RTAs fatality. This finding is supported by the fact that driving ability, skill of driving, and experience have association factors of risky driving behavior (Qirjako *et al*., 2008; Tulu *et al*., 2013; Zewude and Ashine, 2016).

The public transportation system of many resource-constraint countries are not well developed and thus allowing informal and unregulated proliferation of transportations services (ERA, 2005). Minibuses, Buses and Commercial vehicles trucks are more likely to travel more kilometres. They disproportionately involved in traffic accidents in these countries and impose substantial injuries and deaths (Mock *et al.*, 2009; Getu *et al.*, 2013). Similarly, in the current study there is significantly higher RTA fatality in Public transportation vehicles in the current study. This finding is consistent to studies conducted in central and southern Ethiopia (Tulu *et al*., 2013; Asefa *et al*., 2014; Zewude and Ashine, 2016). Another possible reason could be due to public transportation vehicles typically carry large numbers of people at a time that the single accident could result in many deaths at once.

In this study, the magnitude of RTAs fatality was nearly doubled; increased from 11% in 2010 to 20.5% in 2016. This finding was similar with the findings of studies conducted in central Ethiopia (Asefa *et al*., 2014), Kenya (Bachani *et al*., 2012), Libya (Bodalal *et al.*, 2012) and Ghana (Siaw *et al*., 2014). The possible reasons for yearly increase in fatality might be road quality, incomparable space of road with number of cars, changing driving licensing procedures from time to time, behaviours of drivers and pedestrians. Some studies stated risky driving behaviour of drivers, poor traffic safety rules enforcement such as failure to give priority pedestrians, absence of regular check-up of vehicles and poor road using behaviour of the pedestrians might contributed for increased trend of RTA (Abrahim *et al*., 2011; Hidekatsu and Akinori, 2013; Çelik and Senger, 2014; Zewude and Ashine, 2016).

This study has some limitations which cannot able to get valid data on at risk populations, number of vehicle and vehicle fleet of the study area to determine fatality rate. It did not also assess healthcare factors such as the first aid and ambulances availability which could impacts the RTAs fatality.

Conclusion

Substantial number of peoples died due to road traffic accidents in the study area. Rainy weather condition, time RTA occurred, driver's without license, speeding, driver's carelessness, failure to give priorities to pedestrians or other vehicles, pedestrian errors, type and technical problem of the vehicles were factors associated with road traffic accidents fatality. Strengthening the implementation of road traffic safety rules such as following the speed limit, driving license possession, giving priorities for pedestrians or other vehicles; incidental roadside inspection system and monitoring technical regular check-up of the vehicles would be essential. Southwest Shoa zonal and Sebata Hawas district Roads Authority in collaboration with traffic officers should also work on increasing public

awareness on traffic safety rules, traffic signs and symbols. This study also recommends further quantitative and qualitative studies by including different individuals or organizations and triangulating findings. This will help to identify potential risk factors for RTAs deaths and come with possible implementable solution.

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Competing interest

The authors declare that they have no competing interest.

Author's contribution

DK conceived the study, developed the study protocol, conducted data collection, analyzed the data and participated in the interpretation of the finding. MD and TG participated in the development of the study protocol, statistical analysis and interpretation of the finding. FAK participated in the development of the protocol, statistical analysis, interpretation of the finding and manuscript writing. HA participated in statistical analysis, interpretation of the findings and drafted the manuscript. All authors read and approved the final manuscript.

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