HARAMAYA UNIVERSTIY

SCHOOL OF GRADUATE STUDIES

PROPORTION OF FATAL ROAD TRAFFIC CRASHES AND ASSOCIATED FACTORS BETWEEN CHIRO AND HARAR TOWNS, EASTERN ETHIOPIA: A CROSS SECTIONAL STUDY

MPH Thesis

Fekade Ketema

June 2018

Harar, Ethiopia

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PROPORTION OF FATAL ROAD TRAFFIC CRASHES AND ASSOCIATED FACTORS BETWEEN CHRO AND HARAR TOWNS, EASTERN ETHIOPIA: A CROSS SECCTIONAL STUDY

A Thesis Submitted to the College of Health and Medical Sciences, School of Graduate Studies, Haramaya University

In Partial Fulfillment of the Requirements for the Degree of Master of Public Health in Epidemiology

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June 2018

Harar, Ethiopia

APPROVAL SHEET
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SCHOOL OF GRADUATE STUDIES

I hereby certify that I have read and evaluated this Thesis entitled Proportion of Fatal Road Traffic Crashes and Associated Factors between Chiro and Harar Towns, Eastern Ethiopia: A Cross Sectional Study prepared under my guidance by Fekade Ketema I recommend that it be submitted as fulfilling the thesis requirement.

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As a member of the Board of Examiners of the MPH Thesis Open Defence Examination, I certify that I have read and evaluated the Thesis prepared by Fekade Ketema and examined the candidate. I recommend that the thesis be accepted as fulfilling the Thesis requirements for the degree of Master of Public Health in Epidemiology.

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BIOGRAPHICAL SKETCH

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LIST OF ABBREVIATIONS

AOR	Adjusted Odds Ratio
CHMS	College of Health and Medical Sciences
CI	Confidence Interval
DC	Data Collector
DEC	Data Entry Clerk
FTA	Federal Transport Authority
IHRERC	Institutional Health Research Ethical Review Committee
LMICs	Low and Middle Income Countries
PI	Principal Investigator
RTCs	Road Traffic Crashes
RTIs	Road Traffic Injuries
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
UNECA	United Nations Economic Commission for Africa
USD	United States Dollar
WHO	World Health Organization

ABSTRACT

Background: Over 1.2 million people die each year on the world's roads, up to 50 million more sustaining serious injuries and living with long-term adverse health consequences. Low-income countries have fatality rates more than double those in high-income countries despite their low level of motorization. However, there is a paucity of information regarding the magnitude of fatal crashes and associated factors in eastern Ethiopia.

Objectives: To assess the proportion of fatal road traffic crashes and its associated factors between Chiro and Harar towns in Eastern Ethiopia from January 10 to January 20, 2018

Methods: A cross sectional retrospective record review of all 658 road traffic crash police records was conducted using a data retrieving form. The source of data was road traffic crash police records from July 2016 to June 2017 of five district police offices between Chiro and Harar towns. The data collectors were trained police officers within the respective district police offices. Bivariate and multivariable analysis were used to determine associations between fatal road traffic crashes and associated factors. Adjusted odds ratios and 95% confidence interval with P <0.05 were considered as a cutoff point for statistical significance.

Result The proportion of fatal crash was 14.1% [95% CI: 11.4, 16.8]. Crashes occurring in rural areas [AOR= 2.272, 95% CI: 1.192, 4.331], during night time[AOR= 1.960, 95% CI: 1.088, 3.532], over speeding [AOR=6.074, 95% CI: 1.636, 22.556], failure to give priority [AOR=4.951, 95% CI: 1.371, 17.877], type of vehicle i.e. Isuzu [AOR=8.429, CI: 3.415, 20.808], Trucks [AOR= 3.748, 95% CI: 1.256, 11.186] and others (Peugeot, Damas,Automobiles) [AOR= 3.240, 95% CI: 1.127, 9.318] were significantly associated with fatal road traffic crashes.

Conclusion: less than a fifth of the crashes were fatal and this needs timely intervention. Education of drivers on risky behaviors, strict enforcement of traffic rules and regulations and close supervision of type of vehicles known to have increased risk of fatal crashes are recommended

1. INTRODUCTION

1.1 Background

According to the World Health Organization's (WHO's), Road Traffic Injuries (RTIs) is defined as "fatal or non-fatal injuries incurred as a result of a road traffic crash". Road Traffic Crash (RTC) is defined as "collision or incident that may or may not lead to injury, occur on a public road and involving at least one moving vehicle". Traffic safety has complex and multifaceted dimensions, which need various experiences and knowledge. This multi-dimensional diversity is categorized into three areas: human, environmental and vehicle factors (WHO 2004).

Road traffic injuries are predictable and preventable. Many high-income countries have significantly reduced the burden of RTIs. Scientific research has proven to be useful for preventing RTIs in high-income countries. As most of the study is conducted in high-income countries there is a need to conduct studies on issues important for Low and Middle-Income Countries (LMICs) However few resources have been allocated for RTI research in many LMICs (Bishai and Hyder 2003, Ameratunga, et al. 2006, Redelmeier and McLellan 2013).

The United Nations General Assembly adopted a resolution in 2010 that led to the establishment of the Decade of Action for Road Safety (2011–2020). The resolution called on countries to implement the measures identified internationally to make their roads safer. In September 2015, heads of state attending the United Nations General Assembly adopted the historic Sustainable Development Goals (SDGs). One of the new SDG targets (3.6) is to halve the global number of deaths and injuries from road traffic crashes by 2020 (WHO 2015).

1.2 Statement of the problem

Road traffic injuries are currently estimated to be the ninth leading cause of death across all age groups globally and are predicted to become the seventh leading cause of death by 2030. Deaths related to RTI are predicted to increase by 83% in low-income and middle-income countries and to decrease by 27% in high-income countries (Tiruneh et al. 2014, WHO 2015).

Over 1.2 million people die each year on the world's roads, up to 50 million more sustaining serious injuries and living with long-term adverse health consequences. Globally, road traffic crashes are a leading cause of death among young people, and the main cause of death among those aged 15–29 years. When we see road traffic deaths globally by type of road users, the main contributors are car occupants (31%), followed by motorized 2-3 wheelers (23%) and pedestrians (22%). again there are regional variations: in Europe pedestrians and car, occupant account for 26% and 51% of deaths respectively whereas in Africa it is 39% and 40% (WHO 2015, WHO 2017).

The global road traffic fatality per 100,000 population is 17.5. However, there are significant regional variations, the highest being in Africa (26.6) followed by Eastern Mediterranean (19.9) and Western Pacific (17.5). The least is the European region with 9.3. Low-income countries have fatality rates more than double those in high-income countries and there are a disproportionate number of deaths relative to these countries' level of motorization: 90% of road traffic deaths occur in low and middle-income countries, yet these countries have just 54% of the world's vehicles (WHO 2015).

Despite the fact that poor reporting system masks the magnitude of road traffic accidents in Africa, traffic fatalities continued its upward trend in recent years (Lagarde 2007, Chen 2010, Zimmermana et al. 2012, Adeoye 2014). For example, a study in Kilimanjaro region of Kenya shows that the total number of reported accidents in 2008 was 906 while in 2009 it was 1,125. The total mortality reported in 2008 was 147 and 202 in 2009. The total morbidity was 622 in 2008 and 933 in 2009 (Tarimo 2012).

Road transport remains to be the mode of transport that Ethiopia heavily relies on for both domestic as well as for international services. In Ethiopia, there were 478, 244 registered vehicles in 2012/2013. Despite having a very low road network density and vehicle ownership level (5

vehicles per 1000 population in 2013) Ethiopia has a relatively high accident record (UNECA 2009, WHO 2015, Yismaw and Ahmed 2015).

According to the WHO road traffic death rate in Ethiopia is 25.3 per 100,000 population which is higher than the world and almost equal to the African estimate 17.5% and 26.6 % respectively. Furthermore, the number of reported road traffic fatalities (2012/2013) was 3362, which is way less than the WHO estimate of 23, 837 for the same period. Ethiopia stands as one of the worst countries with respect to road safety performance in terms of traffic accident fatalities per 10,000 vehicles which was 95 in 2007/8 (WHO 2015, UNECA 2009).

As well as being a public health problem, road traffic injuries are a development issue: low- and middle-income countries lose approximately 3% of Gross Domestic Product (GDP) as a result of road traffic crashes. The total annual costs of road crashes to low-income and middle-income countries are estimated to be about US$ 65 billion, which is more than the total annual amount received in development assistance (Eric et al. 2011, WHO 2015).

The enormous health and life-related burden caused by motor vehicle injuries implies that such injuries are health problems of economic importance demanding more attention from health planners and policymakers. One study estimated the mean direct cost of motor vehicle injury in Addis Ababa in 2008/2009 FY was 7,037.52 Birr (693.4 USD) whereas the total health and life-related cost of motor vehicle injuries in Addis Ababa was 31,692,892 Birr (3,122,452 USD) (Gebremichael, 2010).

Traffic safety has complex and multifaceted dimensions, which are categorized into three areas: human, environmental and vehicle factors (WHO 2004). Increased death rates in LMICs are driven, at least in part by rapid motorization with a lack of concomitant road safety strategy implementation and safe road infrastructure development (WHO 2015, FTA 2016). Studies conducted in the developing world, including the sub-Saharan region, have reported on incidence, patterns, risk factors, causes, outcomes and socio-economic factors associated with such RTIs (Juillard, et al. 2010, Eze, et al. 2013, Adeloye, et al. 2016). Similarly, in Ethiopia, few studies have been conducted especially in big cities. However, there is lack of information on the magnitude of fatal road traffic crashes and associated factors in Eastern Ethiopia. Therefore, this study is aimed to assess the proportion of fatal road traffic crashes and its associated factors in Eastern Ethiopia

1.3 Significance of the Study

This study tries to show the proportion of fatal road traffic crashes and its associated factors in Eastern Ethiopia. It is believed that findings of the study will be useful for Harari Region Police Commission, East and West Hararghe Zone Police Department and respective woredas between Chiro and Harar towns. It is also believed that the findings of the study will be valuable input for transport departments of the two zones and Harari region. Moreover, it could serve as a baseline material for different stakeholders that are engaged in road safety. The findings of the study could also serve as an input for policymakers and program managers in road safety and healthcare provision. Finally, it could supplement the existing literature on fatal RTCs in the country, region and globally.

1.4 Objectives

1.4.1. General objective

To assess the proportion of fatal road traffic crashes and its associated factors in the past one year (July 2016 to June 2017) between Chiro and Harar towns in Eastern Ethiopia, January 10 to February 10, 2018

1.4.2. Specific objectives

- To assess the proportion of fatal road traffic crashes in the past one year
- To identify factors associated with fatal road traffic crashes in the past one year

2. LITERATURE REVIEW

2.1 Proportion of fatal road traffic crashes

A study in Sana'a, Yemen revealed that the accident rates per 100,000 of the population declined from 234.8 in 2013 to 92.2 in 2015. Mortality rates per 100,000 of the population declined from 15.17 in 2013 to 8.9 in 2015. Moreover 840 people were killed and 9760 people were injured during the same period (Al-Thaifani et al., 2016).

A study based on data from traffic police (2004 to 2009) and national vital registration system (for the year 2006) in Kenya revealed that fatalities due to road traffic injuries increased at an annual rate of 7 percent (95% CI: 6–8; $P < .001$). Injuries to motorcyclists more than doubled from 1.23 per 100,000 in 2004 to 3.63 per 100,000 population in 2009, reflecting an annual rate of increase of approximately 29 percent (95% CI: 27–32; $P < .001$). Analysis of the police data at the provincial level showed that though Nairobi saw the highest rate of RTIs and fatalities in the nation, there was a sharp increase in injury and fatality rates in the Rift Valley province over the period of 2007 to 2009, where the RTI rate increased by 26.52 percent from 35.43 to 44.82 injuries per 100,000 population (Bachani et al., 2012).

A population-based study in two districts of Dar es Salaam, Tanzania has shown that there were 4 deaths and 196 of 6001 individuals were involved in non-fatal RTIs within the previous 12 months, resulting in a non-fatal incidence rate of 32.7 RTIs per 1000 person-years. Moreover, injuries resulting in a fracture correlated with a disability of more than 30 days (Zimmermana et al., 2012).

In Ethiopia, a total of 15,082 accidents were reported in 2007/2008 and 2161 people lost their lives whereas 7140 sustained non-fatal injuries (UNECA 2009). An analysis of six years (July 2005 - June 2011) of police-reported crash data in Ethiopia revealed 12,140 fatal and 29,454 injury crashes on the country's road network. The 12,140 fatal crashes involved 1,070 drivers, 5,702 passengers, and 7,770 pedestrians, totaling 14,542 fatalities, an average of 1.2 road user fatalities per crash (Tulu, 2013).

In a retrospective cross-sectional study in Central Ethiopia from July 2007 to June 2012, a total of 2,335 collisions were registered among these collisions, 17% resulted in death, 14% brought about severe injuries and 12% caused slight injuries. These collisions affected about 1,745 individuals. While 515 (30%) people died, 549 (31.5%) were severely injured, and the remaining 681 (39%)

were slightly injured (Asefa, et al. 2014). In another study on the Addis Ababa – Adama/Hawassa road from 2002 to 2011 the magnitude of fatal crashes was 29.4% (Abegaz et al., 2014).

Two hospital-based studies in Central and Southern Ethiopia revealed that the incidence of road traffic injury in the emergency department of Tikur Anbessa Specialized Teaching Hospital was 36.8%. Whereas 63% of trauma victims in Wolita Zone Hospitals were due to road traffic accidents (Tiruneh et al., 2014; Hailemichael et al., 2015). In a study in Mekelle city, North Ethiopia the magnitude of fatal accidents was 21.8% in 2007 and 15.6% in 2015 (Meresa et al., 2016).

2.2. Factors associated with fatal road traffic crashes

2.2.1. Human /host factors

Human factors take into account the actions or conditions of the driver (e.g., sex, age, driving experience, vehicle ownership status, driver educational background, seat belt non-use, speeding, using alcohol or drugs, inattention, or driving errors, reckless driving, negligent pedestrians, passengers, cyclists and cart pushers.) and occupant (e.g., seating position, seat belt nonuse) (Gebremichael, 2010; Tarimo, 2012; Zewude and Ashine, 2016).

An epidemiological survey on road traffic crashes in Iran shows that being male (AOR 1.50, 95% CI: 1.23 – 1.85), not maintaining eyes on the road (AOR 2.95, 95% CI: 2.61 – 3.34), losing control of the vehicle (AOR 6.50, 95% CI: 5.45 – 7.68), and seat belt noncompliance (AOR 5.40, 95% CI: 4.80–6.10) and exceeding speed limits (AOR 17.9, 95% CI: 12.73 –25.10) were the most important factors for traffic crashes within cities. Being male (AOR 0.75, 95% CI: 0.61 – 0.94), not using seat belt (AOR 2.77, 95% CI: 2.54 - 2.99), sudden lane excursion (AOR 1.91, 95% CI: 1.22 – 1.44) and illegal overtaking (AOR 2.53, 95% CI: 2.20 – 2.93) were the most important factors for traffic crashes out of cities (Bakhtiyaria et al., 2014).

One cross-sectional study in Central Ethiopia showed that driving above the speed limit (AOR 5.3, 95% CI: 2.9-9.6), failing to give priority for other vehicles and pedestrians (AOR 5.03, 95% CI: 2.3-9.3) were determinants of road traffic collision fatality (Asefa et al., 2014). Moreover a study in Tikur Anbesa Hospital in Addis Ababa , Ethiopia showed that being a farmer (AOR = 3.3; 95% CI = 1.06–10.13), conflict with family members (AOR= 7.7; 95% CI = 3.49–8.84),

financial problem (AOR = 9.91; 95% CI = 4.79–6.48), psychological problem (AOR = 17.58; 95% CI =7.70–12.14), and alcohol use (AOR = 2.98; 95% CI = 1.61–5.27) were independently associated with road traffic injury (Tiruneh et al., 2014).

A study in Wolaita Zone of southern Ethiopia shows that drivers aged 18-30 years (AOR=3.4, $p < 0.01$) and drivers aged 31-50 years (AOR=3.0, $p < 0.01$) were more likely to get involved in fatal/serious injury compared to drivers aged $\geq$ 51. Drivers with driving experience of $\leq$ 1 year (AOR=0.22, p-value 0.000), 1-2 years (AOR=0.29, $p < 0.01$) and 2-5 years (AOR=0.56, $p < 0.01$) were less likely to get involved in fatal/serious injury than drivers with more than five years' experience. Moreover drivers with elementary educational status (AOR=5.79, $p < 0.01$), junior educational status (AOR=4.18, p-value 0.000) and secondary educational status (AOR=2.11, $p < 0.01$) were more likely to get involved in fatal/serious injury compared to drivers with above secondary educational status (Zewude and Ashine, 2016).

2.2.2. Environmental/external Factors

Factors that are related to the roadway environment include design factors (e.g., lane width, curves, lack of road signs and markings), roadside hazards (e.g., poles, trees), and driving conditions (e.g., ice, rain, snow, fog or darkness). Environmental factors also include Poor road condition and bad surfaces, light condition, the day of accident and time of the accident (Gebremichael, 2010; Tarimo, 2012; Zewude and Ashine, 2016).

A study in Iran investigating the time and outcomes of the crashes results showed that sunrise (AOR 0.40, 95% CI: 0.30 – 0.49), sunset (AOR 1.19, 95% CI: 1.10 – 1.28) and night (AOR 0.78, 95% CI: 0.68 – 0.81) were important predictors of fatal crashes within cities. Sunrise (AOR 0.77, 95% CI: 0.60 – 0.97), sunset (AOR 2.48, 95% CI: 2.20 – 2.81) and night (AOR 0.75, 95% CI: 0.71 – 0.80) were important predictors of fatal crashes out of cities. The fatal and non-fatal crashes are more frequent at the night time for all risk factors (20.50 pm to 5.14 am) (Bakhtiyaria et al., 2014).

A case–control study on the Yaoundé–Douala road section, Cameroon showed statistically significant associations with injury crash risk for flat road profile (AOR 1.52, 95% CI: 1.15–2.01),

irregular road surface conditions (AOR 1.43, 95% CI: 1.04 – 1.99), roadside obstacle situated less than 4 m from the road edge (AOR 1.99, 95% CI: 1.09 – 3.63), three-legged intersections (AOR 3.11, 95% CI : 1.15 – 8.39) and four-legged intersections (AOR 3.23, 95% CI: 1.15–6.92). Built-up areas were significantly associated with injury crash sites where verge depth was 0 m (AOR 2.33, 95% CI: 1.97 – 2.77) (Bhatti et al., 2010).

In a study among road crash victims attending a district hospital in Kenya road crashes in rainy weather (AOR 2.9, 95% CI: 1.3 - 6.5) and nighttime crashes (AOR 2.0, 95% CI: 1.1 - 3.9) were independent risk factors for sustaining severe injury (Eric, et al. 2011). One cross-sectional study in Central Ethiopia showed that driving at midnight (AOR 1.67, 95% CI: 1.2-2.4) was a determinant of road traffic collision fatality (Asefa et al., 2014).

In a study in Wolita, Southern Ethiopia it was revealed that accidents occurring in clear weather conditions are (AOR= 5.93, $p < 0.01$) times more likely to result in fatal/serious injury compared to accidents occurring in rainy weather. Accidents in daylight (AOR=0.06, $p < 0.01$) and dark but lighted conditions (AOR=0.07, $p <0.01$) are less likely to be fatal/serious compared to accidents occurring in darkness. Similarly accidents in the morning (AOR= 4.05, $p < 0.01$), day (AOR=3.85, $p <0.01$) and evening (AOR=5.99, $p <0.01$) are more likely to be fatal/serious compared to accidents occurring during the night (Zewude and Ashine, 2016).

The same study also identified accidents on dry roads are (AOR= 0.153, $p < 0.01$) less likely to be fatal/serious compared to accidents on the wet road. Moreover, accidents on asphalt road are (AOR= 5.75, $p < 0.01$) times more likely to be fatal/serious compared to accidents on the non-asphalt road. Accidents on no junction road are (AOR=1.93, $p <0.01$) times more likely to be fatal/serious than accidents on junction roads. Moreover accidents involving vehicle crashing with pedestrian (AOR=4.48, $p <0.01$), vehicle crashing with another vehicle (AOR=4.95, $p <0.01$) and other types of crashes (AOR=5.75, $p <0.01$) are more likely to be fatal/serious injury compared to vehicles crashing with objects on or near the road (Zewude and Ashine, 2016).

2.2.3. Vehicle factors

Vehicle factors are design issues that contribute to a crash and the risk of injury in a crash (e.g., vehicle size, vehicle type and vehicle age). They also include poor mechanical condition of

vehicles like nondurable tires, poor bodywork, defective brakes and loose wheel nuts (Gebremichael, 2010; Tarimo, 2012; Zewude and Ashine, 2016).

A study in Ethiopia revealed that trucks and minibus taxis were involved in the majority of crashes, while automobiles (small vehicles) were less involved in crashes relative to other vehicle types, partially because small vehicles tend to be driven fewer kilometers per annum (Tulu, 2013).

In a study conducted in Central Ethiopia, it was revealed that vehicular technical problems (AOR 19, 95% CI: 6.4 – 56) were determinants of road traffic collision fatality. (Asefa et al., 2014). Another study among taxi driver in Northern Ethiopia showed that driving a mechanically faulty taxi (AOR 4.91, 95% CI: 2.81 – 8.61) was strongly associated with road traffic crash involvement (Asefa et al., 2015). In a study in Amhara region of Ethiopia, almost half (51%) of all crashes involved freight vehicles followed by passenger vehicles which constitute one-third (34.5%) of all the accidents (Mekonnen and Teshager, 2014).

A study in Wolaita Zone of South Ethiopia, shows that automobiles (AOR=4.26, p-value 0.000), Bajajs (AOR=4.48, $p < 0.01$), Minibuses (AOR=2.58, $p < 0.01$) and buses (AOR=3.35, $p < 0.01$) were more likely to get involved in fatal/serious injury compared to other vehicles (Zewude and Ashine, 2016). One study in Albania also identified fatal accidents involved especially vans and trucks (OR=4.12, 95% CI: 2.34, 7.24) (Qirjako et al., 2008).

2.2.4 Conceptual framework

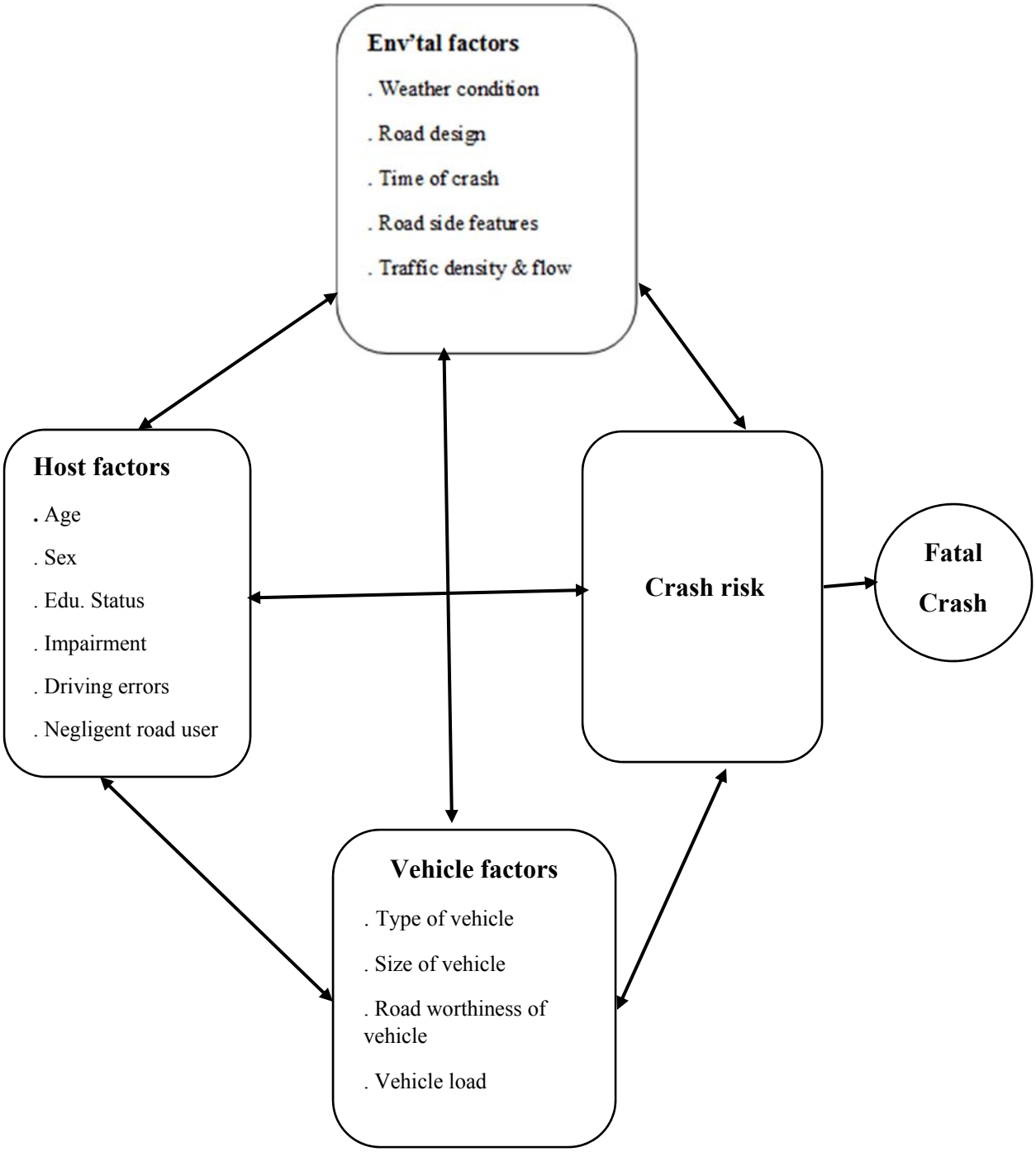

Figure 1 Conceptual framework shows factors associated with fatal RTCs (Adopted from Schepers, etal 2014)

3. METHODS AND MATERIALS

3.1. Study Area and period

The study area includes Chiro district, Tulo district, Goro Gutu district, Haramaya district and Harar town. Kersa and Meta districts were not part of the study as the records in these districts were incomplete. These are districts/towns found on the 200km road linking Chiro (located 326 km east of Addis Ababa) and Harar (located 525 km east of Addis Ababa) towns. This is one of the most important road transport corridors of the country as it links the Ethiopian Somali region, Harari region, East and West Hararghe zones of Oromia region and Dire Dawa Administration with the capital Addis Ababa. As a result, there is high traffic on the road. The data was collected from January 10, 2018 to February 20, 2018

3.2. Study Design

A cross-sectional study was employed

3.3. Source Population

All RTC records from July 1, 2016 to June 30, 2017 of district police offices on the road between Chiro and Harar towns of Eastern Ethiopia

3.4. Study Population

All RTC records from July 1, 2016 to June 30, 2017 of district police offices on the road between Chiro and Harar towns of Eastern Ethiopia

3.5. Inclusion Criteria and Exclusion Criteria

3.5.1. Inclusion Criteria

RTC records from July 1, 2016 to June 30, 2017 of district police offices on the road between Chiro and Harar towns

3.5.2. Exclusion Criteria

Incomplete RTC records (for which the outcome of the crash is not recorded) from July 1, 2016 to June 30, 2017 of district police offices on the road between Chiro and Harar Towns were excluded

3.6. Sample Size Determination

For Objective 1: The sample size was calculated by using single population proportion formula. A study conducted in Central Ethiopia showed that the proportion of fatal road traffic crash in 2011/2012 was 15.1% (Asefa, et al. 2014).

$$n = \frac{z^2 pq}{d^2} = \frac{(1.96)^2 (0.151)(0.849)}{(0.03)^2} \quad = 547$$

Where n= the desire sample size

p= assumed probability of road traffic fatality (0.151)

q= 1- p

$Z_{(\alpha/2)}$ = critical value at 95% confidence level (1.96)

d= margin of error (0.03)

Adding 20% for non-response the sample size was 656

For Objective 2: Sample size was calculated using Epi Info, the following assumptions were made:

Power= 80%

Confidence level= 95% and

Ratio of exposed to non-exposed = 1

Table 1 Sample size calculation for associated factors

Factors	Fatal road traffic crash		Sample size
	Exposed	Non exposed	
Sex of driver (Asefa et al 2014)	Female = 33%	Male= 16.5%	238
Light condition (Asefa et al 2014)	Early morning/night/mid night = 27.6%	Day light =14.8%	350

Hence the largest sample size of the two objectives (i.e. 656) was taken. A total of 729 road traffic crashes were reported from July 1 2016 to June 30, 2017 in the study area. Even if the calculated sample size was 656 all 729 RTCs records were included in the study as this is manageable. Hence the final sample was 729.

3.7. Sampling Technique

There was no sampling.

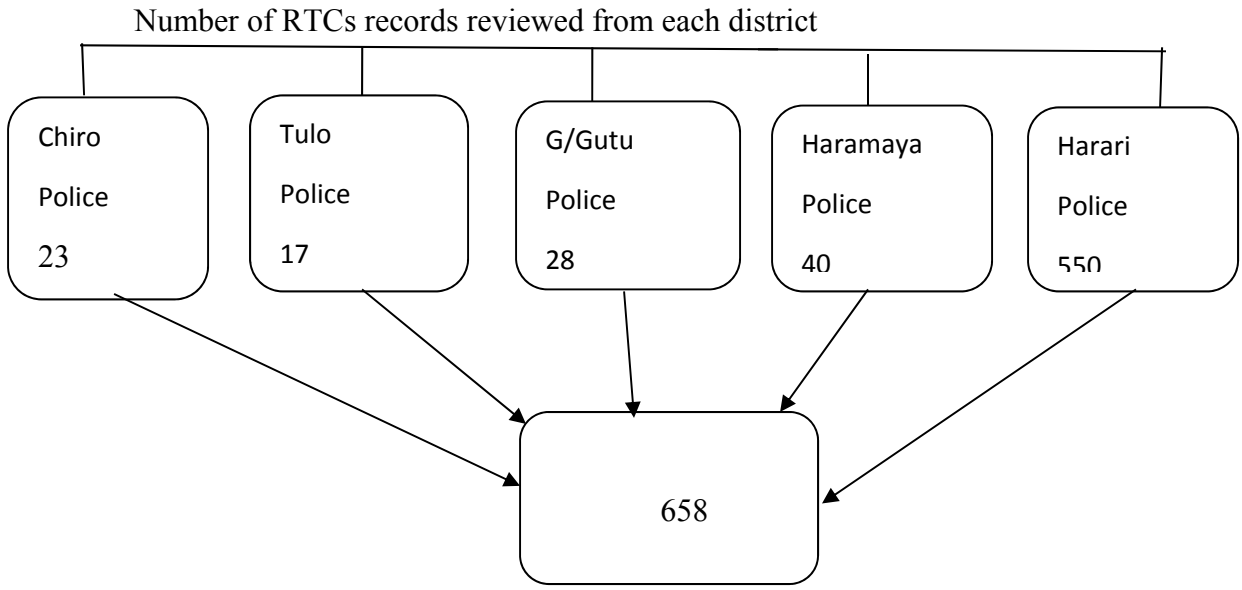

Figure 2 Schematic presentation of number of RTC records to be reviewed from each police office

3.8. Data Collection methods

3.8.1. Data collection instruments

A structured data retrieval form developed from RTC investigation form of traffic police was used to retrieve relevant information from RTC police reports of respective woreda police stations

3.8.2. Data collectors

Data collectors were 8 (eight) trained police officers working in the respective woreda police stations.

3.8.3. Procedure of data collection

Data collectors were trained for two days and supervised closely during data collection. Two MPH graduate students were used as supervisors.

3.9 Study Variables

3.9.1. Dependent variable

- Fatal road traffic crashes

3.9.2. Independent variable

Only variables which could be found from the RTC police records were included. Hence other variables from literature were excluded.

- Human factors (sex of driver, the age of driver, driving experience, vehicle ownership status, driver educational status, over speeding, careless driving, failure to give priority, failure to keep distance)
- Environmental factors (weather condition, light condition, type of road, road condition, the day of crash and time of the crash)
- Vehicle factors (vehicle type ,vehicle service and vehicle defect)

3.10 Operational Definition of Terms

- Fatal road traffic crash- at least one person has died immediately or within 30 days as a result of RTC (Asefa, et al. 2014).
- Non-fatal road traffic crash- no death but severe injury, slight injury or property damage occurred as a result of RTC (Asefa, et al. 2014).
- Severe injury- at least one person was injured and admitted in hospital, as a result of RTC (Asefa, et al. 2014)

- Slight injury- at least one person required medical care, but no fatalities or injuries that required hospitalization occurred as a result of RTC (Asefa, et al. 2014).
- Property damage- all crashes that did not result in injuries or deaths. (Asefa, et al. 2014)

3.11 Data quality control

The data retrieval form was translated to local language, training was provided for data collectors and data collection was closely supervised. Moreover data was checked for completeness on daily basis and entered into EPI data version 3.1.

3.12 Methods of data analysis

The analysis was done by SPSS version 20. Descriptive statistics like percentages and frequency distributions were used to describe the magnitude of road traffic crashes, characteristics of victims and other factors. Bivariate analysis was used to determine associations between fatal road traffic crashes and associated factors like victim's characteristics, type of vehicle involved, time, location and cause of injury. Multicollinearity among the independent variables with checked by tolerance and VIF. Variables with P- value $\leq$ 0.20 were used in the binary logistic regression. Adjusted odds ratios (AOR) and 95% confidence interval (CI) with P <0.05 was considered statistically significant. Model fitness was checked by Omnibus (p value <0.05) and Hosmer Lemeshow tests (p value >0.05).

3.13 Ethical consideration

Ethical clearance was secured from Institutional Health Research Ethical Review Committee (IHRERC) of College of Health and Medical Sciences (CHMS), Haramaya University. Official letter of support was written to Harari Region Police Commission, East and West Hararghe Zone Police department. All concerned officials were briefed about the purpose of the study and informed, voluntary, written and signed consent was be secured from the head of police departments/commission. The anonymity of individuals involved in RTC was maintained.

3.14 Information dissemination

The findings of the study will be disseminated to respective police offices, transport bureaus and Haramaya University School of Graduate Studies and institutions who are working on road safety. Attempts will be made to publish the study.

4. RESULT

4.1 Background

A total of 729 RTCs were reported between Chiro and Harar towns, Eastern Ethiopia, from July 2016 to June 2017. Only 658 (90.3%) records were reviewed and the remaining 71 records were excluded for incompleteness. The great majority 514(78.1%) of RTCs occurred during the daytime, 517(78.6%) took place in urban areas and 591(89.8%) on asphalt roads respectively. (Table 2).

Almost all 657(99.8%) of the drivers were male and 376(62.4%) were aged 19 – 30. More than two-thirds 404(66.7%) of the drivers had secondary and above educational level, three fourth 512(77.8%) were employed/hired and 394(75%) had 5 – 10 years driving experience (Table 2).

Table 2 Frequency distribution of selected characteristics of RTCs between Chiro and Harar towns, Eastern Ethiopia from July 2016 to June 2017

Characteristics	Frequency	%
Time of crash (n=658)		
Day	514	78.1
Night	144	21.9
Sex of driver (n=658)		
Male	657	99.8
Female	01	0.2
Age of driver (n=603)		
≤ 18	10	1.7
19 – 30	376	62.4
31 – 40	150	24.9
>40	67	11.1
Educational status of driver (n=606)		
≤ Primary/1-8	202	33.3
Secondary and above	404	66.7

Vehicle ownership of driver (n=658)		
Owner	122	18.5
Employee	512	77.8
Others	24	3.6
Driving experience (n= 525)		
<5 years	15	2.9
5 – 10 years	394	75.0
>10 years	116	22.1
Service of vehicle (n=581)		
<5 years	238	41.0
5-10 years	313	53.9
>10 years	30	5.2
Vehicle defect (n=658)		
Yes	21	3.2
No	637	96.8
Location of crash (n=658)		
Urban	517	78.6
Rural	141	21.4
Road pavement (n=658)		
Asphalt	591	89.8
Non asphalt	67	10.2

4.2 Proportion of RTCs

Less than a fifth 93(14.1%) [95% CI: 11.4, 16.8] of the RTCs were fatal and 565(85.9%) were non-fatal (Figure 3). Moreover, 283(50.1%), 212(37.5%) and 70(12.4%) of the non-fatal RTCs resulted in property damage, slight injury and severe injury respectively

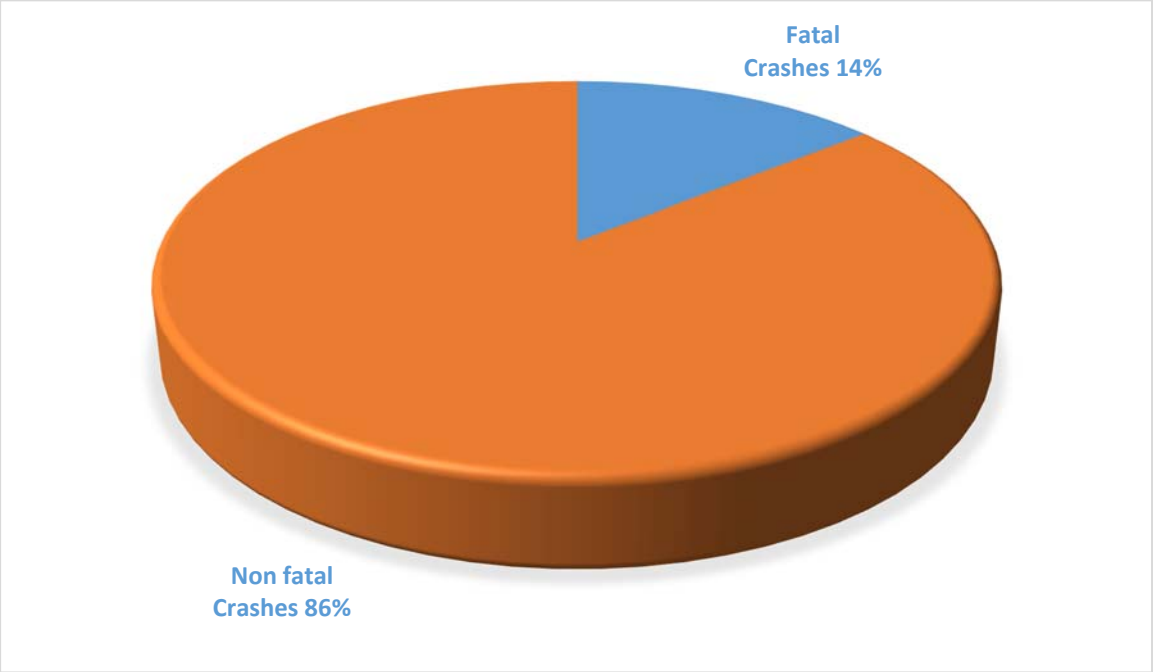

Figure 3 Distribution of fatal and non-fatal crashes between Chiro and Harar towns, Eastern Ethiopia from July 2016 to June 2017

Overall 557 people (29 drivers, 243 passengers and 285 pedestrians) were affected by the crashes While 108(19.4%) people died, 105(18.9%) were severely injured and 344(61.8%) sustained slight injuries.

More than three fourth of the fatalities 87(80.6%) were male and 21(19.4%) were female. Among those killed in RTCs, 7(6.5%) were drivers, 38(35.2%) were passengers and 63(58.3%) were pedestrians (Table 3).

Table 3 Characteristics of RTC victims between Chiro and Harar towns, Eastern Ethiopia from July 2016 to June 2017

Characteristics	**Fatal crash**		**Non-fatal crash**	
	No	**%**	**No**	**%**
Sex of victims				
Male	87	80.6	296	65.8
Female	21	19.4	154	34.2
Total	108	100.0	450	100.0
Age of victims				
< 15	15	13.9	52	11.6
15 - 29	57	52.8	245	54.4
30 – 44	18	16.7	101	22.4
45 – 59	16	14.8	35	7.8
>60	02	1.9	17	3.8
Total	108	100.0	450	100.0
Victims by type of road user				
Driver	7	6.5	22	4.9
Passenger	38	35.2	205	45.6
Pedestrian	63	58.3	223	49.6
Total	108	100.0	450	100.0

4.3 Factors associated with fatal RTCs

4.3.1 Human factors

In the bivariate analysis of human factors drivers' age, educational status, vehicle ownership, driving experience and level of driver's driving license did not have a statistically significant association with fatal crashes (Table 4).

Table 4 Characteristics of RTCs by human (driver) factors Characteristics of RTCs between Chiro and Harar towns, Eastern Ethiopia from July 2016 to June 2017.

Variables	Outcome		Crude OR 95% CI	P value
	Fatal (%)	Nonfatal (%)		
Age of driver (n=603)				
≤ 18	1 (10.0)	9 (90.0)	1.00	0.364
19 – 30	29 (7.7)	347 (92.3)	0.752 [0.092, 6.145]	
31 – 40	19 (2.7)	131 (87.3)	1.305 [0.156, 10.889]	
>40	6 (12.2)	61 (11.9)	0.885 [0.095, 8.230]	
Educational status of driver (n=606)				
≤ Primary/1-8	26 (12.9)	176 (87.1)	1.00	0.269
Secondary and above	40 (9.9)	364 (90.1)	0.744 [0.190, 4.429]	
Vehicle ownership of driver (n=658)				
Owner	11 (9.0)	111 (91.0)	1.00	0.120
Employee	80 (15.6)	432 (84.4)	1.869 [0.962, 3.630]	
Others	2 (8.3)	22 (91.7)	0.917 [0.190, 4.429]	
Driving experience (n= 525)				
<5 years	01 (6.7)	14 (93.3)	1.00	0.955
5 – 10 years	33 (8.4)	361 (91.6)	1.280 [0.163, 10.039]	
>10 years	9 (7.8)	107 (92.2)	1.178 [0.139, 10.006]	
Driver's license (n=569)				
1st level	2 (6.1)	31 (93.9)	1.00	0.447

2nd level	5 (7.0)	66 (93.0)	1.174 [0.216, 6.392]	
3rd level	28 (9.0)	282 (91.0)	1.539 [0.350, 6.772]	
4th level	11 (13.1)	73 (86.9)	2.336 [0.489, 11.161]	
5th level	11(14.0)	61 (15.3)	2.795 [0.583, 13.401]	
No driving license	3 (9.1)	30 (90.9)	1.550 [0.242, 9.940]	
Cause of crash (n=658)				
Over speeding	31 (20.7)	119 (79.3)	7.728 [2.290, 26.085]	≤ 0.0001
Failure to give priority	42 (16.2)	217 (83.8)	5.742 [1.735, 19.007]	
Careless driving	11 (9.2)	108 (90.8)	3.022 [0.818, 11.166]	
Others	6 (15.8)	32 (84.2)	5.562 [1.313, 23.562]	
Failure to keep distance	3 (3.3)	89 (96.7)	1.00	

4.3.2 Environmental factors

In the bivariate analysis of environmental factors time of the crash, the location of the crash, district and cause of the crash had a statistically significant association with fatal crashes (Table 5).

Table 5 Characteristics of RTCs by time, cause and other environmental factors between Chiro and Harar towns, Eastern Ethiopia from July 2016 to June 2017.

Variables	**Outcome**		**Crude OR 95% CI**	**P value**
	Fatal (%)	Nonfatal (%)		
Time of crash (n=658)				
Day	58 (11.3)	456 (88.7)	1.00	≤ 0.0001
Night	35 (24.3)	109 (75.7)	2.525 [1.580, 4.034]	
Location of crash (n=646)				
Urban	43 (8.3)	474 (91.7)	1.00	≤ 0.0001
Rural	50 (35.5)	91 (64.5)	6.057 [3.803, 9.645]	
District (n=658)				

Harar	41 (7.5)	509 (92.5)	1.00	≤ 0.0001
Haramaya	16 (40.0)	24 (60.0)	8.276 [4.077, 16.802]	
G/Gutu	14 (50.0)	14 (50.0)	12.415 [5.544, 27.802]	
Tulo	6 (35.5)	11 (64.7)	6.772 [2.383, 19.242]	
Chiro	16 (69.6)	7 (30.4)	28.376 [11.046, 72.894]	
Weather condition(n=658)				
Good	88 (14.1)	534 (85.9)	1.00	0.965
Rainy/Cloudy	05 (22.2)	31 (77.7)	0.979 [0.371, 2.585]	
Road surface (n=658)				
Asphalt	81(13.7)	510 (86.3)	1.00	0.349
Non asphalt	12(17.9)	55 (82.1)	1.374 [0.705, 2.677]	
Road condition (n=658)				
Dry	88(13.9)	545 (86.1)	1.00	0.391
Wet	5 (20.0)	20 (80.0)	1.548 [0.566, 4.232]	

4.3.3 Vehicle factors

In the bivariate analysis of vehicle factors type of vehicle had a significant association with fatal crashes whereas vehicle defect and vehicle service didn't have a significant association with fatal crashes (Table 6).

Table 6 Characteristics of RTCs by vehicle factors between Chiro and Harar towns, Eastern Ethiopia from July 2016 to June 2017.

Variables	Outcome		Crude OR 95% CI	P value
	Fatal (%)	Nonfatal (%)		
Type of vehicle (n=658)				
Cycle/M.Cycle/Bajaj	9 (4.1)	213 (95.9)	1.00	≤ 0.0001
Minibus	15 (12.5)	105 (87.5)	3.38 [1.432, 7.980]	
Isuzu freight/Isuzu public	42 (34.7)	79 (65.3)	12.582 [5.856, 27.034]	
Trucks	13 (19.1)	55 (80.9)	5.594 [2.274, 13.760]	
Pick up/Toyota LC	4 (6.8)	55 (93.2)	1.721 [0.511, 5.798]	
Others*	10 (14.7)	58 (85.3)	4.080 [1.584, 10.511]	
Vehicle has defect (n= 658)				
Yes	4 (19.0)	17 (81.0)	1.00	0.511
No	89 (14.0)	548 (86.0)	0.690 [0.227, 2.099]	
Service of the vehicle (n=581)				
<5 years	22 (9.2)	216 (90.8)	1.00	0.964
5 – 10 years	31 (9.9)	282 (90.1)	1.079 [0.608, 1.917]	
>10 years	3 (10.0)	27 (90.0)	1.091 [0.306, 3.888]	

*Peugeot, Damas, Automobile, Coaster, Bus

4.3.4 Multivariate analysis

In the multivariate analysis time of the crash, location, district, type of vehicle and cause of the crash had a statistically significant association with fatal crashes whereas vehicle ownership did not. Night time crashes were 1.96 times more likely to be fatal than crashes during the day [AOR= 1.960, 95% CI: 1.088, 3.532]. Crashes occurring in rural areas were 2.27 times more likely to be fatal compared to crashes in urban areas [AOR=2.272, 95% CI: 1.192, 4.331]. RTCs in Haramaya were 5.492 times [AOR=5.492, 95% CI: 2.338, 12.903], Guro Gutu 7.030 times [AOR=7.030,

95% CI: 2.736, 18.061] and Chiro 16.238 times [AOR=16.238 95% CI: 5.643, 46.728] more likely to be fatal than RTCs in Harar (Table 7).

Concerning causes of crashes over speeding vehicles were 6.074 times more likely to be involved in fatal crashes than vehicles which failed to keep distance with the nearest vehicle [AOR=6.074, 95% CI: 1.636, 22.556]. Moreover, vehicles which failed to give priority for pedestrians and other vehicles were 4.951 times more likely to be involved in fatal crashes than vehicles which failed to keep distance with the nearest vehicle [AOR= 4.951, 95% CI: 1.371, 17.877].

When we see the type of vehicles, Isuzus were 8.429 times more likely to be involved in fatal crashes compared to Cycle/Motor Cycle/Bajajs [AOR=8.429, 3.415, 20.808]. Trucks were 3.748 times more likely to be involved in fatal crashes compared to Cycle/Motor Cycle/Bajajs [AOR= 3.748, 95% CI: 1.256, 11.186]. Moreover, other types of vehicles like Peugeot, Damas, Automobile, Coaster, Bus were 3.240 times more likely to be involved in fatal crashes compared to Cycle/Motor Cycle/Bajajs [AOR= 3.240 (1.127, 9.318] (Table 7).

Table 7 Factors independently associated with fatal RTCs between Chiro and Harar towns, Eastern Ethiopia from July 2016 to June 2017.

Variables	**Outcome**		**Crude OR 95% CI**	**Adjusted OR 95% CI**
	Fatal (%)	Nonfatal (%)		
Time of crash				
Day	58(11.3)	456(87.7)	1.00	1.00
Night	35(24.3)	109(75.7)	**2.525 [1.580, 4.034]**	**1.960 [1.088, 3.532]**
Vehicle ownership				
Owner	11(9.0)	111(91.0)	1.00	1.00
Employee	80(15.6)	432(84.4)	1.869 [0.962, 3.630]	0.719 [0.315, 1.644]
Others	02(9.1)	22(90.9)	0.917 [0.190, 4.429]	0.690 [0.115, 4.132]
Location of crash				
Urban	43(8.3)	474(91.7)	1.00	1.00
Rural	50(35.5)	91(64.5)	**6.057 [3.803, 9.645]**	**2.272 [1.192, 4.331]**

District				
Harar	41(7.5)	509(92.5)	1.00	1.00
Haramaya	16(40.0)	24(60.0)	**8.276 [4.077, 16.802]**	**5.492 [2.338, 12.903]**
G/Gutu	14(50.0)	14(50.0)	**12.415 [5.544, 27.802]**	**7.030 [2.736, 18.061]**
Tulo	06(35.3)	11(64.7)	**6.772 [2.383, 19.242]**	2.040 [0.584, 7.119]
Chiro	16(69.6)	7(30.4)	**28.376 [1.046, 72.894]**	**16.238 [5.643, 46.728]**
Cause of crash				
Overspeeding	31(20.7)	119(79.3)	**7.728 [2.290, 26.085]**	**6.074 [1.636, 22.556]**
Failure to give priority	42(16.2)	217(83.8)	**5.742 [1.735, 19.007]**	**4.951 [1.371, 17.877]**
Careless driving	11(9.2)	108(90.8)	3.022 [0.818, 11.166]	1.586 [0.382, 6.589]
Others ±	6(15.8)	32(84.2)	**5.562 [1.313, 23.562]**	2.959 [0.540, 16.224]
Failure to keep distance	3(3.3)	89(96.7)	1.00	1.00
Type of vehicle				
Cycle/M cycle/Bajaj	9(4.1)	213(95.9)	1.00	1.00
Minibus	15(12.5)	105(87.5)	3.381 [1.432, 7.980]	2.518 [0.953, 6.655]
Isuzu F/Isuzu P	42(34.7)	79(65.3)	**12.582 [5.856, 27.034]**	**8.429 [3.415, 20.808]**
Truck	13(19.1)	55(80.9)	**5.594 [2.274, 13.760]**	**3.748 [1.256, 11.186]**
Pick up/Toyota LC	4(6.8)	55(93.2)	1.721 [0.511, 5.798]	2.735 [0.748, 10.003]
Others*	10(14.7)	58(85.3)	**4.080 [1.584, 10.511]**	**3.240 [1.127, 9.318]**

*Peugeot, Damas, Automobile, Coaster, Bus

± Vehicle defect, unidentified causes, pedestrian error

5. DISCUSSION

This study assessed the magnitude of fatal RTCs and associated factors between Chiro and Harar towns. The magnitude of fatal RTC was 14.1%. In the multivariate analysis location (urban/rural), time (day/night), district, the cause of crash and type of vehicle were statistically significant predictors of fatal RTC.

The magnitude of fatal RTC in this study was similar to other studies in Ethiopia and one study in Albania (16.7%, 11.8%, 11.9% and 17% respectively) (Assefa et al., 2014; Tulu, G., 2013; UNECA, 2009; Qirjako et al., 2008). However, it is lower than the finding of a study (29.4%) on the road between Addis Ababa and Adama/Hawassa (Abegaz et al, 2014). This could be attributed to the difference in traffic fleet on the two roads, environmental factors, study period and sample size of the two studies.

This study also revealed that RTCs during the night were more fatal than RTCs during daytime [AOR= 1.960, 95% CI: 1.088, 3.532]. This finding is consistent with other studies in Ethiopia, Kenya and Iran (Assefa et al., 2014; Zewude and Ashine, 2016; Eric et al., 2011; Bakhtiyaria et al., 2014). This could be due to reduced visibility, fatigue and less traffic hence speeding during night time.

In this study, it was found out that RTCs occurring in rural areas were more fatal than RTCs in urban areas [AOR= 2.272, 95% CI: 1.192, 4.331]. One study in Albania also found out that fatal accidents were more prevalent on intercity roads than within cities [AOR= 4.25, 95% CI: 3.11-5.82] (Qirjako et al., 2008). This could be related to among other things high traffic in urban areas/cities which in turn could lower speed. The speed limit in urban areas could be the other reason

In this study, there was significant variation in fatality between the districts. As can be seen from the multivariate analysis RTCs in Haramaya, G/Gutu and Chiro were more fatal compared to Harar [AOR=5.492, 95% CI: 2.338, 12.903], [AOR=7.030, 95% CI: 2.736, 18.061] and [AOR=16.238 95% CI: 5.643, 46.728] respectively. This could be attributed to the majority of the records reviewed were from Harar and Harar is largely an urban area compared to other districts.

In this study, it was found out that over speeding [AOR=6.074, 95% CI: 1.636, 22.556] and failure to give priority for pedestrians and other vehicles [AOR=4.951, 95% CI: 1.371, 17.877] were statistically significant predictors of fatal RTCs. This finding is consistent with a study in Central Ethiopia, where driving above speed limit [AOR=5.3, 95% CI: 2.9, 9.6] and failing to give priority [AOR=5.0, 95% CI: 2.3, 9.3] were identified as significant predictors of fatal collisions (Assefa et al., 2014). Another study in Albania also identified high speed [AOR= 2.54, 95% CI: 1.623, 3.98] as a significant factor of fatal accidents (Qirjako et al, 2008). This could be explained by the fact that at higher speeds it would be difficult to control the vehicle hence more likely to get involved in a crash. Moreover as the speed of a vehicle increases the injury tend to be more severe/fatal. For example, an adult pedestrian has less than a 20% chance of dying if struck by a car at less than 50 km/h but almost a 60% risk of dying if hit at 80 km/h (WHO, 2015).

In this study Isuzus, Trucks and other type of vehicles (Peugeot, Damas, Automobile, Coaster and Bus) were more likely to be involved in fatal RTCs compared to 2 and 3 wheelers like Cycle/Motor Cycle/Bajaj. Minibuses had a statistically significant association in the bivariate analysis but were not statistically significant predictors of fatal RTCs in the multivariate analysis. This finding is not consistent with a study a study in Wolaita Zone of southern Ethiopia, which shows that automobiles, Minibuses were more likely to get involved in fatal/serious injury compared to other vehicles (Zewude and Ashine, 2016). Another study in Albania also showed that fatal accidents involved especially vans/trucks [AOR= 4.12; 95% CI: 2.34, 7.24] (Qirjako et al., 2008). The role of minibus vehicles in fatal RTCs needs further investigation.

The fact that Isuzus, trucks, Peugeot, coaster and buses are more involved in fatal crashes in this study could be attributed to the extensive use (hence long mileage) of these vehicles for public transportation/freight. Hence the longer the mileage the more likely this vehicles are to be involved in fatal crashes. The other reason could also be Peugeot Vehicles have been in service in the study area for more than 30 years.

This study has limitations like incompleteness and inconsistency of records. Moreover, important factors like alcohol consumption, drug/substance use, seat belt use, helmet use and mobile use while driving were not recorded.

6. CONCLUSIO AND RECOMMENDATION

6.1 Conclusion

This study has shown that less than a quarter (14.1%) of the RTCs resulted in a fatality. Time of crash, location (urban/rural), district, over speeding, failure to give priority to pedestrian and other vehicles, type of vehicle were statistically significant factors associated with fatal RTCs. Drivers age, educational status, driving experience, level of driver's license, didn't have a statistically significant association with fatal RTCs. These findings call for a timely intervention.

6.2 Recommendation

Based on the study findings the following recommendations are forwarded

- Drivers

✓ Drivers should be educated about risks associated with night time driving

✓ Drivers should be educated about to driving cautiously in rural areas

- Police officers

  ✓ Traffic police officers should enforce traffic rules and regulation strictly during night time

  ✓ Traffic police officers should enforce traffic rules and regulations strictly in rural areas

  ✓ Attention should be given to nighttime travels

  ✓ Attention should be given to Isuzu (both public and freight), trucks, Peugeot and Damas vehicles

  ✓ Should educate the public about increased risks of fatal crashes during night time and in rural areas.

- East Haraghe Zone, West Hararghe Zone, Haramaya woreda, G/Gutu woreda and Chiro woreda police departments/offices should

  ✓ Work to alleviate the high level of fatal crashes through educating the public and strict enforcement of traffic rules and regulations

- East Haraghe Zone, West Hararghe Zone, Harari region and respective woredas

  ✓ Should record all relevant information concerning RTCs and make sure that the records are complete and consistent

- East Hararghe Zone Police department should

  ✓ Provide standard Crash report registration books to districts who didn't have the registration book.

- Further studies focusing on human factors should be carried out

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8. APPENDICES

8.1 Appendix A

Information sheet and informed voluntary consent form for the head of Police Commission (English version)

My name is ----------. I am working as a data collector for the study being conducted in this office by Fekade Ketema who is studying for his Master's Degree in Public Health at Haramaya University, College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and your institution is being selected as the study setting.

The Study Title: Proportion of Fatal Road Traffic Crashes and Associated Factors in Eastern Ethiopia: A Cross Sectional Study

The purpose/Aim of the Study: The purpose of this study is to identify the magnitude of fatal road traffic crashes and its associated factors on the road between chiro and Harar towns. The finding of this study will provide in-depth information for respective police and transport offices in the area. Moreover, the aim of this study is to write a thesis as a partial requirement for fulfillment of masters of public health in epidemiology.

Procedure and Duration: I will collect the data from the road traffic crash records in the police stations using a checklist. The checklist has about 20 points and it will take about 30 minutes to complete each checklist.

Risk and Benefit: the risk of participating in this study is very minimal, but only taking few minutes for showing us the documented data. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for the local health planners.

Confidentiality: the information that will be provided will be kept confidential. There will be no information that will identify the participants in particular. The findings of the study will be general for the study community and will not reflect anything particular of individual persons in the institution. The checklist will be coded to exclude showing names and no reference will be made in oral or written reports that could link participants to the research.

Rights: participation in this study is fully voluntary. The institution has the right to declare to participate or not in this study and has the right to withdraw from the study at any time and this will not label the institution for any loss of benefits which it otherwise is entitled.

Contact Address: If there are any questions or enquires any time about the study or the procedures, please contact:

Principal investigator

Name Fekade Ketema

Address: Harar

Mobile phone: 0911 361108

e-mail address:fekadeket@gmail.com

Address of IHRERC

P.O.Box 235, Harar

Tel. 0254662011

Haramaya University College of Health and Medical Sciences

Declaration of informed voluntary consent

I have read the participant information sheet, I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions about things that might have been unclear. I was also informed that the institution has the right to withdraw from the study at any time or not to give any data that the institution does not want to give. I am also informed that the police commission has the right to stop this study from being conducted if any misdeeds and unethical procedures are observed during the data collection process in the police department premises. Therefore, I declare my voluntary consent on behalf of _____ police commission management to allow this study to be conducted in the police office with my initials (signature)

Name of Head of the police office_____Signature_____Date_____

Name of data collector_____Signature_____Date_____

N.B this is signed face to face in the presence of the data collector. Please provide a copy of this consent to the official.

8.2 Appendix B

Information sheet and informed voluntary consent form for head of police commission/office (Afan Oromo Version)

Maqaan koo_____dha. Ani qorataa obboo Faqaadee Katamaa barumsa Mastarsii Fayyaa Hawaasaa Univarsiitii Haromaayaa, Kollejjii Saayinsii Fayyaa Harar, deppartimentii 'Epidemiology'tti qoranno waa'ee balaa tiraafika daandii konkolaataa fi wantoota isaan walqabatan irratti godhaniif nama ragaalee walitti qabuudha. Waajirri keessan akka bakka qorannoo kanaatti waan filameef haala qorannoo Kanaan isiniif ibsaa yeroo keessan akka naaf kennitan kabajaan isiin gaafadha.

Mata duree qorannoo: Baha itoopiiyatti balaa tiraafika daandii konkolaataa Ciiroo hanga Harar fi waantoota isaan wal-qabatan

Kaayyoo: odeeffannoon qorannoo kanarra walitti qabamu komishiinii poolisii fi ministeera fayyaaf, dhaabbilee fayyaa gargarsa ummataaf , qoratoota birootiifi waajjiralee godinaaf aanaatiif akkataa balaan tiraafika daadii itti ittifamuu fi xiqqeffamu irratti ni fayyada. Hunda caala kaayoon qorannoo kana ulaagaa sagantaa 'MPH in Epidemilogy' tiif barbaachisu guutuuf barbaachisaadha.

Adeemsa: cheeklistii qophaa'e irrati hundahuun ragaaleen galmaa'anii jiran galmee gubbaadhaa ni funaanamu. Cheecklistiin kun qaphxilee qorannoo 20 kan qabate yoo ta'u nannoo daqiiqaa 30 fudhata.

Midhaa fi fayidaa: sababa qorannoo kana irratti dhaabbanni kun hirmachuuf rakkon irra hin ga'u , garuu yeroo kee daqiiqaa muraasa nawaliin dabarsitu qofa. Waan qorannoo kan irratti dhaabbanni kun irrmaateef waanti kallatiin kanfalamu hin jiru. Garu bu'aan qoranno kanaa waajjira kannaf raga garii laata.

Iccitii eeguu: iccitiin odeeffannoo funaanamuu kan eegamu ta'u isaa sifan mirkaneesa. Raga koodiidhaa funaanama waan ta'eef waanti nama dhuunfa adda baasu kan akka maqaa namaa hin barreefamu. Argannon isaas nama dhuunafa osoo hin taane ummaticha qorannoon irratti godhamu bakka bu'a.

Mirgoota: himannan qorannoo kana fedhii irratti kan hunaa'eedha. Gaaffilee barbaade dhiisus tahee sa'aa kamittuu hirmanna kee addan kutuu dandeessa.

Teessoo wal-qunamitii: gaafiin yookin rakkinni kamuu qorannoo kana irratti yoo dhaabbata keessan muddate karaa teessooo armaan gadii nusqunnamuu dandeessu

Teessoo qorataa

Maqaa: Faqaadee Katamaa

Teessoo: Harar

Bilbila Mobaayilii: 0911 361108

Teessoo IHRERC

Sanduuqa poostaa: 235, Harar

Bilbila: 0254662011

Yunivarsitii Haramaayaa,Kollejjii Saayinsii Fayyaa Harar

Formii Waliigaltee

Odeeffannoo armaan oli irraa kanneen akka kayyoo qorannichaa, fayidaa, rakkoo, icciitii eeguufi mirgaan qorannoo kana irratti hirmaachuu haalan na hubbachiisani jiru. Waajirri keenya sa'aa fedhhetti qorannoo kanatti hirmaachuu dhaabuu assasumas raga kennuu hin baraadin kennuu dhiisuuf mirga kan qabu ta'uu isaa waan na hubachiisaniif, akka bakka bu'aa waajira _____tii qorannoo kana irratti fedhii kootin waajirri kun akka hirmaatu eeyyamuu koo mallatoo kootin akkataa armaa gaitti nan mirkaneesa.

Maqaa I/Gaafataa waajiraa_____Mallatoo_____Guyyaa_____

Maqaa nama raga funaanuu_____Mallatoo_____Guyyaa_____

Hub.Walii galteen kun fuuldura nama raga funaanutti mallatteeffama. Kopiin waliigaltee kana bakka bu'aa waajiraaf ni kennama.

8.3 Appendix C Checklist English Version

Check list

Proportion of Fatal Road Traffic Crashes and Associated Factors between Chiro and Harar Towns, Eastern Ethiopia: A Cross Sectional Study

No_____ Data collector_____ Supervisor_____

No	Question	Choose item or fill in the space provided	Remark
101	Date of crash	dd_____mm_____yyyy_____	
102	Day of crash	1. Monday 2. Tuesday 3. Wednesday 4. Thursday 5. Friday 6. Saturday 7. Sunday	
103	Time of crash	1. Day time_____ O'clock 2. Night time_____ O'clock	
104	Location of crash	District_____ Site of crash_____	
105	Type of road on which the crash happened	1. Asphalt 2. Nonasphalt	
106	Road condition	1. Wet 2. Dry	
107	Weather condition at the time of crash	1. Good 2. Rainy 3. Other/specify_____	
108	Light condition at the time of the crash	1. Daylight 2. Dark early night/morning 3. Dark midnight	

109	Type of vehicle responsible for the crash	1. Cycle/motor cycle 2. Bajaj 3. Automobile 4. Minibus 5. Pick up 6. Isuzu (public) 7. Isuzu (freight) 8. Bus 9. Truck 10. Others/specify_____	
110	Service of the vehicle	_____years	
111	The vehicle has defect	1. Yes/Specify/_____ 2. No	
112	Cause of crash	1. Overspeeding 2. Failure to give priority 3. Failure to keep distance 4. Careless driving 5. Vehicle defect 6. Pedestrian error 7. Unidentified causes 8. Others/specify_____	
113	Sex of driver	1. Male 2. Female	
114	Age of driver	_____Years old	
115	Educational status of the driver	1. Unable to read and write 2. Read and write 3. Elementary (1-8grade) 4. Grade 9-10 5. Grade 11-12/Certificate/Diploma 6. Degree and above	

116	Vehicle ownership status of the driver	1. Owner 2. Employee 3. Friend/relative 4. Rented	
117	Driving license	1.No driving license 2. 1st Level 3. 2nd Level 4. 3rd Level 5. 4th Level 6. 5th Level 7. Special	
118	Driving experience of the driver	_____ years	
119	Was there death as a result of the crash?	1. Yes 2. No	
120	If no, the outcome of the crash?	1. Serious injury 2. Slight injury 3. Property damage	

Part II Type of injury and personal characteristics of the injured

No	Type of injury 1. Fatal 2. Heavy injury 3. Slight injury	Sex 1. Male 2. Female	Age (In years)	Type Of road User injured 1. Driver 2. Passenger 3. Pedestrian
1				
2				
3				
4				
5				
6				
7				
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9				
10				
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12				
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14				
15				

8.4 Appendix D Checklist Afan Oromo Version

Check list

lakka_____raga funaanaa_____ Supervayizara _____

Lakk	Gaaffii	Koodii filaadha ykn iddoo duwwaa guutaa	Yaadanoo
101	Gaafa balaan qaqabee	Guyyaa_____Ji'a_____bara_____	
102	Guyyaa balaan qaqaabee	1. Wixaata/Isniina 2. Kibxata/salaasa 3. Roobii 4. Kamisa 5. Jimaata 6. SanbataXiqaa/sabtii 7. Dilbata	
103	Yeroo itti balaan qaqabee	1. Guyyaa (Sa'aati)_____ 2. Halkaan (Sa'aati)_____	
104	Bakkaa itti balaan qaqabee	Aanaa_____ Iddoo balaan itti qaqabe_____	
105	Gosa daandii balaan irraati qaqabee	1. Asphalti 2. kan asphaltii hin tahin	
106	Haala daandii	1. Jiidha 2. Gogaa	
107	Haali qileensa yeeroo balaan qaqabee	1. Garii 2. yeroo rooba 3. kan biraa (ibsii)_____	
108	Haali ibsa yeroo balaan qaqabee	1. Ifaa guyyaa 2. Ifa ganamaa/yeroo dura galgalaahu 3. Dukana Halkan walakaa	
109	Gosa konkolaataa balaan irratti qaqabee	1. Cycle/motor cycle 2. Bajaj 3. Automobile 4. Minibus	

		5. Pick up 6. Isuzu (Ummataa) 7. Isuzu (Feumsaa) 8. Bus 9. Truck 10. kan biraa (Ibsii)_____	
110	Tajaajila konkolataa	Waggaa_____	
111	Konkolataan hiirina qaba	1. eeye/ibsii/_____ 2. Hin qabu	
112	Sababa balaan kun itti qaqabe	1. Safiisan ol konkolaachiisuu 2. Dursa kennuu dhabuu 3.Fageenyaa egatanii konkolaachiisu dhabuu 4. Ofeegannoon alaa konkolaachiisu 5. Rakkoo konkolataa 6.Dogongora nama lukaan deemun umaamen 7. Sabaaba hin beekamneen 8.kanbiraa (ibsii)_____	
113	Saala konkolaachisaa	1. Dhiira 2. Dhalaa	
114	Umurii/amata konkolaachisa	Waggaa _____	
115	Sadarkaa barnoota konkolaachisa	1. Dubbisuu fi barreesu kan hin dandeenyee 2. Dubbisuu fi barreesuu qofa 3. Sadarkaa 1^{ffaa}(kutaa 1-8) 4. Sadarkaa^{2ffaa} (kutaa 9-10) 5. Kutaa 11-12/Sartifiikeeta/Dipiloomaa 6. Digirii fi isaa ol	
116	Konkoolaachiisan	1. Abaa qabeenyatti 2. kan Qaxaramee 3. Hiriiya/Fira abaa qabeenyaa	

		4. kan kireefatee	
117	Hayaama konkolaachisumaa	1.Hayamaa konkolaachisumaa hin qabuu 2. Sadarkaa 1ffaa 3. Sadarkaa2ffaa 4. Sadarkaa 3ffaa 5. Sadarkaa4ffaa 6. Sadarkaa5ffaa 7. kan addaa tahee	
118	Muxxanoo konkolachisumaa	Waggaadhaan _____	
119	Sabaaba Balaa konkolaatatin balaan lubbuu baase /dua'a qaqabee?	1.Eeyyee 2.lakkii	
120	Deebiin gaafi 119 lakii yoo ta'e, Gosa miidhaa qaqabee?	1. Midhaa ciimaa 2. Midhaa salphaa 2. Midhaa qabeenyaa	

Kuta II Gosa miidhaa fi haala naamusa nama midhaan irraa gahee

No	Gosa midhaa 1. Du'aatti lubbuu/ kan lubbuun darbe 2. Midhaa ciimaa 3. Midhaa salphaa	Saala 1. Dhiira 2. Dhalaa	Umurii/amata	Gosa nama miidhammee 1. Konkolachisaa 2. Namaa imalaaf konkoolata keessa jiru 3. nama miilan daandii irra deemu
1				
2				
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4				
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8.5 Appendix E

Curriculum vitae