

**Effect of Human Factors on Road Traffic Accidents (RTAs): The Case of Hawassa City, SNRS, Ethiopia**

Siquarie Shudda Dangisso\*

Abstract

*This paper discusses the effects of human factors on RTAs in Hawassa city. The research intended to attain two specific objectives - first, to examine the human errors that obstruct road traffic safety, and second, to the significant human factors contributing to road traffic accidents (RTAs). The research has used qualitative and quantitative approaches to provide a variety of perspectives that can be studied. Simple descriptive analyses (mean, standard deviation, and percentage) using tables, graphs, and figures were conducted to analyze human factors' effect on road traffic accidents (RTAs) in the study area. Road traffic safety and improper utility and road use are considered factors affecting road traffic safety. The statistical analysis and result revealed that independent variables (speedy driving, drunken driving, distracted driving, road users neglecting) have a moderate correlation. However, they have a moderate, strong, and very strong relationship to the dependent variable, i.e., road traffic safety. In order to identify the main human factor contributing to road traffic accidents (RTAs), an analysis carried out by multiple linear regression analysis discovered four factors (independent variables) that significantly increase the risk of road traffic accidents (RTAs). Therefore, human factors have been identified to account for the occurrence of road traffic accidents (RTAs).*

**Keywords:** *Effects of Human Factors, Road Traffic Accidents, Drunken & Distracted Driving, Negligence, Hawassa, Ethiopia*

**Introduction**

Although transportation refers to the supply system enabling people and goods to move or be moved, it entails road traffic crashes that include life and property loss behind its goal causing RTA (Martin, 2015; World Health Organization (WHO, 2018). Likewise, Road Traffic Accident (RTA) is an enormous problem in Ethiopia, particularly in Hawassa city, Sidama, Ethiopia. RTA is rampant and seems out of control by concurrent road traffic management and systems regulation. However, the city is an emerging tourist and business center, and domestic visitors' death tolls are bitter from time to time. Existing condition tips the main problem is human performance-related causes, i.e., over-speed, drunken driving, distracted driving, and neglecting the traffic law. Therefore, it requires direct whereabouts in order to control the mounting Road Traffic Accident (RTA) problem. So, the researcher was motivated to examine RTAs about

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\* Ph.D. Scholar, Hawassa University, Ethiopia. Email: [siquarie@gmail.com](mailto:siquarie@gmail.com)

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human factors contributing to traffic crash occurrences. Research findings are expected to improve the capacity to manage the human factors affecting traffic safety in the study area.

Hawassa city, the capital of the newly emerged Sidama region, contributes to much of the misery of RTAs in the country. As an effect, RTA in Hawassa city is a cause of significant losses of human and economic resources. Eventually, the most shocking and terrible effects are deaths involving pedestrians and children. Thus, appropriate and targeted action is needed most immediately. The rising cases of accidents need to be investigated to obtain scientific evidence to improve road traffic safety. The main intention of the study was to explore the causes and factors responsible for the accidents, particularly to identify the share of human faults.

Road transportation provides benefits both to society and to individuals by facilitating the movement of people and goods. Likewise, it enables increased access to economic and social activities, which, in turn, have direct and indirect positive impacts. However, road transportation has also placed a considerable burden on people's lives in the form of RTAs (WHO, 2020).

### **Global Trends on RTA**

RTAs are global health and socio-economic development problem and the leading cause of death for all age groups. Deaths due to RTAs are predicted to become the fifth-leading cause of death by 2030 (WHO, 2020). Therefore, more than 1.35 million people die yearly, and Between 20 and 50 million more people suffer non-fatal injuries, with many incurring a disability due to their injury (WHO, 2020). About 50 million people are injured or disabled as a result of road traffic crashes. It makes a loss of 518 billion US dollars in the property (Abaynew, 2020).

In addition, reports pointed out that 90% of road traffic deaths occur in developing countries. Low and middle-income countries account for only 20% of vehicles while comprising a mean of 80% of casualties. Comparing the result shows that Africa is the highest death rate ranked continent by road traffic injury. Africa remains the least motorized region and suffers the highest rates of road traffic crashes, with death rates of 24 per 100000 population involving vulnerable road users such as pedestrians, cyclists, and motorcyclists (*ibid*).

When lookout to across Africa, road transport systems are a vital facilitator for economic growth, but, as is the case around the world, the safety of those systems is letting the continent down. The World Health Organization projects a 50% per capita increase in road trauma in Sub-Saharan

Africa by 2030. Road safety is a major development issue in Africa; therefore, a collective responsibility to advance institutional, policy, and investment reforms to address the very crucial issue (WHO, 2020).

### **RTA Trends in Ethiopia**

Ethiopia aims to become a middle-income country, and the development of the road transport system will play a vital role in this. However, recent experience shows that its road transport systems cannot safely cope with its 1 million vehicles. New trends and approaches to managing safety on our roads are needed. These new approaches address the institutional road safety management functions that will shape effective interventions that improve the safety of all Ethiopians who depend on and use our roads (Minister of Transport (MoT), 2020).

Ethiopia has major road safety complications. Local reports indicate that more than three thousand Ethiopians die, and ten thousand people are injured because of road traffic accidents yearly (Amdeslasie *et al.*, 2016). According to the MoT (2020), an annual increase in the 10-15 percent motor vehicle fleet increases upward pressure on road trauma suffered in Ethiopia. According to WHO (2020) report, Ethiopia is considered one of the most vulnerable countries where the RTAs kill and injure many road users in day-to-day activities. Thus, RTAs are a critical injury that causes disabilities and death in Ethiopia, which could need due investigation.

According to the WHO (2018) explanations, RTAs death in Ethiopia reached 29,386 or 4.18 percent of total deaths. The death rate is 36.78 per 100,000 population, ranks Ethiopia 24<sup>th</sup> in the world, thereby 13 people die every day due to traffic accidents.

Similarly, the finding in the workshop, organized in coordination with the United Economic Commission for Africa Development Bank, discloses that 4,133 people died by RTAs in 2020. Besides RTAs have been one of the causes of death; with about 1.2 million vehicles and a population of 110 million, Ethiopia has one of the world's largest accidents-to vehicles ratio (New Business Ethiopia, 2020).

Acquiescent to the MoT (2020), the number of fatalities due to RTA continued to increase in the country. Analyzing the trend of traffic accidents over the past five years, the number of serious injuries has increased by an average of 13.7 percent per year. As a result, the number RTAs

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increased from 6,484 in 2014/15 to 6,929 in 2019/20. On the other hand, the number of people killed in road accidents increased from 3,495 in 2014/15 to 4,133 in 2019/20, an average increase of 3% per year.

In terms of international performance, 6.4 deaths per 10,000 vehicles in 2016, and a similar period, our county's performance was 61.4 (Transport Authority, 2018). Also, an unpublished official report of MoT (2020) revealed that in the country, 3299 people were killed, 5524 were heavily injured, and 4391 were the victim of light injuries. Consequently, 736.9 million ETB properties were damaged.

Likewise, the leading causes of traffic accidents in the country are the drivers' incompetence and misconduct. The main reason for this is that the driver training and certification process is in a state of high inefficiency and quality trouble, which is mainly because most training institutions (60%) are not qualified to provide standard service (Transport Authority, 2018)

### **RTA Trends in Sidama National Region**

According to the Sidama Regional Transport and Road Development Bureau (SRTRDB, 2021) bureau official report expressions, the RTAs situation is worsening. In 2021 registered death by RTAs was 170, which is a 142 percent increase compared with the same time registered report in 2020. Injuries by RTAs were 246 (184 were heavy) increased by 174 percent compared to 2020.

The property loss was 6 million Ethiopian Birr (ETB), increasing 110 percent from last year. Due to lockdowns and restrictions on transport movements in the country as well as globally because of the COVID-19 virus phenomenon, as a result, the RTAs were reduced significantly, even internationally. However, in the Sidama region, RTAs increased out of anticipation.

This data shows, in the region, a limited focus exists on the effectiveness of prevention efforts for road traffic injury. Moreover, it may lead to an emphasis on interventions for road users who are at high risk. Addressing the human factors on the RTAs and interventions related to road users in an integrated manner, allowing for more effective prevention measures that have been appropriate and effective in several settings, needs to be considered, whereas in some cases, facilitating road safety improvements where further progress had proved challenging.

### **RTA Trends in Hawassa City**

Hawassa city has been facing challenges in alleviating the RTAs. The road traffic crashes that were reported to the police for the year ending 2018 confirmed 30 people's death and 114 people's injuries (31 are serious injuries). In addition, 1.7 million ETB estimated property damaged (Finance and Economy Development Department (FEDD), 2018).

The suffering from RTAs in all directions has become familiar in the city. Recent reports have shown an increase in the number of RTAs in Hawassa city. According to the official report of Sidama National Region Government (SNRG) Transport and Road Development Bureau, in the last eight months (2020/2021), 101 RTAs have been registered. As a result, 30 people were killed and 95 injured in car and motorbike accidents. Among the victims, 60 people are reported heavily injured, and due to a road traffic crash, 1 million ETB were bankrupted.

The worst face of the problem is that traffic injury encompasses deaths involving pedestrians and children. According to the city police department RTAs data record from 2018 up to 2021, 634 traffic accidents were registered. Thereby, 164 people were killed, 433 people were injured (333 persons with serious injury), and 3.7 million ETB property was destroyed.

In another way, the number of road fatalities fell significantly during the half of 2020 generally because of a state emergency and strict containment measures aimed at reducing the spread of the COVID-19 virus in 2020 since the endemic was announced; however, in the Hawassa city, it went inversely.

The researcher observed a rising frequency of RTA in the study area. Therefore, Hawassa city's number of road traffic fatalities has not dropped but somewhat increased. In addition to that, the magnitude of road traffic injuries in the city is mainly obtained from police records, and the sources may be affected by underreporting of the cases. The existing systems to collect data on RTAs fatality, injury, and related road safety problems may be challenging to record and scale the problem.

### **Statement of the Problem**

The RTA remains the leading cause of death and disability by injury and an immense cause of devastating property. Over a million people die yearly on the roads, and ten million suffer non-fatal injuries. Almost the fatalities on the roads occur in low-income and middle-income

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countries, which have only 48% of the world's vehicles. Half those who die in RTA are collectively vulnerable road users (WHO, 2020). The data conveys that the road traffic accident occurrence derived prominently from misuse of transport facilities.

Ethiopia is a country of people who have long struggled for poverty reduction and the security of other basic needs. Nowadays, it faces another challenge: road traffic mortality and morbidity from RTAs. Therefore, road traffic deaths and injuries have emerged as the country's leading social and economic challenges. The effect of road transport accidents on the socio-economic aspects is even worse (MoT, 2020).

Although different factors may be involved in RTA events, the primary factors are classified into human and environmental, out of which human factors are much more responsible for many accidents (WHO, 2018). According to Abaynew (2020), RTA is found to be an emerging man-made injury that has been taking many lives per day, especially in developing countries. Therefore, it depicts that the gaps remain to be investigated for the human safety of all road users. In addition, speed control, the enforcement of drunken driving, distracting driving, and improvements in safety devices are all interventions that should be tested for effectiveness of the intervention.

The researcher believed that human factors are the most prominent contributing factors to RTAs. Human factors (road users' errors) include all the drivers' and pedestrians' related factors. Consequently, many injuries and deaths on the road are highly human-related factors (WHO, 2018).

Hawassa city is the capital of the newly emerged Sidama region, proportionally contributing to much misery of RTAs in the country. Hawassa City Administration (HCA) is investing in road construction and related infrastructures aiming at access to mobility and transportation in the city; notwithstanding RTAs remain one of precarious problems. In half of the year (2020-2021), 101 road traffic accidents were registered by the City Administration. According to the report, 30 people were killed, more than 90 persons were injured, and 60 people reported severe injury (this includes traffic police and transport safety experts) from car and motorbike accidents. One million birr property was devastated in Hawassa city by this half of the year.

As an effect, RTA in Hawassa city is a cause of significant losses of human and economic resources. Eventually, the most shocking and terrible effects are deaths involving pedestrians and

children. On the other hand, people are disabled or injured due to road traffic accidents; as a result, they struggle to cope with the long-term consequences. Likewise, pedestrians account for the highest proportion of road fatalities in Hawassa city.

The rising challenge wants to obtain scientific evidence to improve road safety. Thus, appropriate and targeted action is needed most immediately. The main intention of the study was to know the causes and factors responsible for the accidents, particularly to identify the share of human faults.

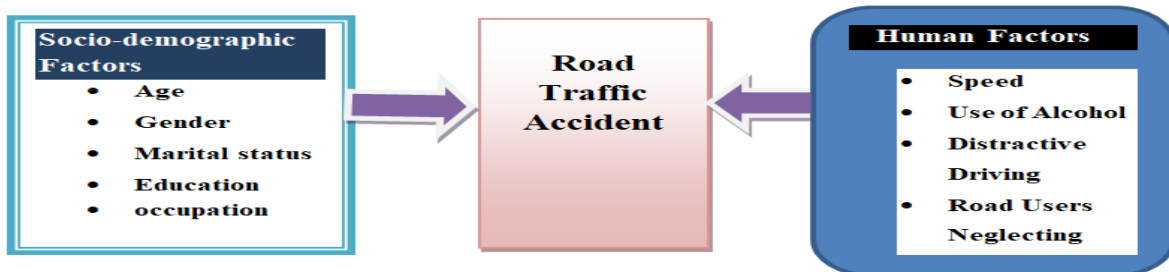
However, many pieces of research carried out by different scholars worldwide, either domestic, discovered the impacts of RTA on the economy and social and health problems in general. Therefore, it is limited to identify the human factors contributing to RTAs and the improper road users that entail traffic crashes, particularly in Hawassa city regarding RTAs.

Thus, the study's primary objective is to examine the human factors in road traffic accidents in Hawassa city. The study aims to evaluate the hypothesis that human factors can predict road accidents. Human factors considering the risk factors, this research work provided evidence of possible effective intervention. Finally, it is to derive-up with applicable recommendations to enhance the enforcement of road safety laws to improve and sustain.

### **Conceptual Framework**

To assess human factors contributing to RTAs in Hawassa city, Sidama, Ethiopia, have been considered in a conceptual framework; the independent variables (drivers, road users, and socio-economic factors) are as follows:

**Figure 1: Conceptual Framework of Human Factors Affecting RTAs**



**Source:** Researcher Own Sketch (2021)

## **Materials and Methods**

### **Research Design**

The study has applied a cross-sectional research design to obtain pertinent information concerning the recent experience of human factors that affect road traffic. The qualitative and quantitative approaches analyze primary and secondary data sources.

### **Sampling Frame**

The target group for the study was the Regional Police Commission and the Transport and Road Development Bureau. The sample frame for the research was the list of Road Traffic Police Commission and Transport and Road Development Bureau as well as the City Administration Police Department and Transport and Road Development Department officers and supportive staff, respectively. The police department listed data shows 8 traffic police officers were from the Regional Police Commission and 120 traffic police were from the City administration in 2020. According to Hawassa City Transport and Road Development Department data, 86 transport experts in the City Administration and 90 workers in the Regional Transport Bureau work collaboratively and under supportive supervision.

The target group is selected because they are policymakers (regional structure), regulators, experts, and drivers while they are pedestrians. Therefore, they are considered to give appropriate information and are supposed to affect or be affected by a road traffic accident in relation to human factors.

### **Sampling Procedures and Techniques**

To carry out this study researcher selected a population from the Sidama Region purposely. The researcher selected Hawassa city out of other cities purposely from the newly emerged Sidama region. The study area was selected because of the researcher's familiarity and good knowledge of the areas to achieve the study's objective. Hence, the study population was sampled from all employees of traffic police and transport officers living in the study area. The sample unit of this study was employees within the two sectors.

In order to select the representative sample respondents in the study area, a multi-stage random sampling technique was applied. Hence, it is intended to select two Bureaus out of the 18



Bureaus - the Hawassa Policy Office and Hawassa Transport and Road Development Department were selected to determine the effect of human factors on road traffic accidents.

In the second stage, the participants were employees of respected offices selected using a systematic random sampling technique from each bureau's list. In such a design, the selection process starts by picking some random point in the list, and then every 9th element was selected until the desired number was secured.

### **Sample Size Determination for Traffic and Transport officers**

The researcher also used the list of road traffic police, transport officers, and workers in Hawassa city. According to Hawassa City Transport and Road Development Office data, there were 128 police and 176 transport officers and workers in 2020. In addition, the purposive interview was conducted to identify the human error in RTAs. The purposive interview focused on drivers, passengers, and pedestrians.

In order to determine the representative sample sizes for the total target population of this study, the researcher used the formula developed by Yamane (1967). According to Yamane, it has a confidence level of 95% with a sampling error of 5%; the sample size "n" was determined as follows:

$$n = \frac{N}{1 + N(0.05)^2}$$
$$n = \frac{304}{1 + 304(0.05)^2} \quad n = 173$$

Where "n" is the sample size, "N" is the total population, and "e" is the level of precision. Accordingly, the total sample size for this study is 173. In the case of this study, a total of 173 respondents were selected from two sectors by systematic sampling technique. For equal representation, the sample size was distributed by using the population proportion sample (PPS) formula (Kothari, 2004).

Therefore, the sample size proportion calculation is as follows:

$$n_1 = (p_1 * n) / N$$

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Where,

n1= sample of proportion

P1= is the population of the sample area

n= is the sample size

N= is the total population of officers in the two structures.

**Table 1: *Sample Size Distribution***

N <sub>0</sub>	structure	Bureau	Employees		Sample size (n=173)	
			Male	Female	Male	Female
1	Sidama Region	Police Commission	8	0	5	0
		Transport Bureau	52	38	30	21
2	Hawassa city	Police Department	63	57	36	33
		Transport Department	51	35	29	20
	<b>Total</b>		174	130	100	74

### **Sources and Data Collection Methods**

The primary data was collected using the instruments of questionnaires and key informant interviews. Secondary data were gathered from published and unpublished data sources. The unpublished data sources were research works, public/private individuals, and organizations.

### **Research Design and Tools of Analysis**

#### **Qualitative and Quantitative Approach**

A combination of qualitative and quantitative approaches was used in the research to provide a variety of perspectives. Both analyses were applied to determine all independent and dependent factors related to the accident occurrence. Based on a more detailed understanding of the background of the human factor through interviews, it helped to categorize the causes of traffic accidents focusing on the failure of the human factor.

#### **Reliability and Validity**

##### ***Reliability***

Reliability is defined as being fundamentally concerned with issues of consistency of measures (Bryman & Bell, 2003). Three prominent factors are related to whether a measure is reliable: stability, internal reliability, and inter-observer consistency. Bryman and Bell (2003) suggested that in a multiple-item measure, each answer to each question is aggregated to form an overall score; we need to ensure that all our indicators are related. In this study, internal reliability was considered. It can be tested using Cronbach's alpha method. A result of 0.7 and above implies an acceptable internal reliability level, as Hair *et al.* (2003) suggested.

### **Validity**

Validity is defined as how much any measuring instrument measures what it is intended to measure. Validity refers to the issue of whether an indicator (or set of indicators) that is devised to gauge a concept really measures the concept or not. Bryman and Bell (2003) also suggested that the important issues of measurement validity relate to whether a measure of concepts really measures concept. Several ways of establishing validity are face validity; concurrent validity; predictive validity; construct, and convergent (Bryman & Bell, 2003). In this research, construct validity has been used. Correlation analysis between the variables was performed for construct validity in terms of the discriminate validity test.

Validity tests were conducted to select and assess the final items of the construct that were finally used for statistical testing. The content validity of the instrument for the present study was ensured as items were identified from an extensive review of related literature and reviewed by professionals and academicians. Pilot tests were then conducted for the instrument similar to the population for the study. The purpose of the pre-testing was to refine the questionnaire and assess the validity of the measures.

### **Descriptive Analysis**

The results of the survey were analyzed using descriptive statistics. There are many basic techniques for analyzing quantitative data. In this study, the researcher chose the software of SPSS to analyze the exploratory factors. It is easy for the research to operate. SPSS for Windows is the most widely used computer software for analyzing quantitative data for social scientists. Simple descriptive analyses (mean, standard deviation, percentage) were carried out to analyze

the effect of human factors on RTA in the study area. Data presentation was conducted along with figures and graphs to compare various RTA indicators in the study area. The researcher also used inferential statistics using correlation to associate the socio-demographic and human factors on RTA, such as age, sex, educational attainment, speed, use of alcohol, distractive driving, and road users' neglect.

Given the scales of items for a construct, Cronbach's alpha was calculated to assess the reliability of those items. For constructs with alpha under a certain threshold (0.7 in this report), items within each construct were checked in order to ensure that the items had high correlations.

After reliability was confirmed, the summated averages of the items in each construct were studied further. The correlation matrix was calculated to show the pair-wise correlations between constructs, which provided valuable but limited information about hypotheses testing.

## **Inferential Statistics**

### ***The Relationship between Human Factors and RTA***

The statistical analysis used correlation coefficients explaining the relationship between the human factors and RTA. As Bereon L.K. (2004), the correlation coefficient is one of the statistical tools used in analyzing data. It was used in measuring the strength of the relationship between two variables - dependent variable, RTA, and the independent variable, human factors.

### ***Diagnostic Tests for Model***

Before fitting the selected variables into the multiple linear regression models, it was necessary to test for model assumptions. According to Gujarati (2004), to make proper statistical inferences, model diagnostic tests need to be carried out to prove the assumptions and make appropriate statistical inferences. Therefore, the five basic assumptions of a multiple linear regression model are briefly discussed below:

#### ***Normality***

The assumption postulates that the disturbance terms are normally distributed. A normal distribution is symmetric about its mean, while skewed distribution would not be symmetric. When this assumption does not hold, we cannot use the simple t and F tests for significance. According to Gujarati (2004), if the residuals are normally distributed, the Shapiro-Wilk test

statistic would not be significant, and the disturbance is said to be normally distributed. However, the current study's normality assumption was checked visually using a histogram. If the histogram is bell-shaped, infer that the residual (disturbance or errors) are normally distributed or that the assumption usually distributed error term is not violated.

### ***Linearity***

The assumption of linearity states that the degree to which the change in the dependent variable is related to the independent variables changes. Plots of the regression residuals through SPSS software were used to determine whether the relationship between the dependent variable (RTA) and the independent variables (speed, use of alcohol, distractive driving, and road users neglecting) are linear.

### ***Multicollinearity***

According to Gujarati (2003), multicollinearity is a situation where it becomes difficult to identify the independent variable's separate effect on the dependent variable because of the existing strong relationship. In other words, multicollinearity is a situation where explanatory variables are highly correlated. Therefore, for the current study, VIF and tolerance were used to test the existence of multicollinearity. As a rule of thumb, if the VIF is greater than ten and tolerance is less than 1, the variable is said to be highly collinear (Gujarati, 2003).

## **Results and Statistical Analysis**

### **Background Characteristics of Respondents**

Analyzing the background characteristics of the respondent's sex, age, educational level, job title, and work experience are important to understand their profile included in the study. The results are presented as follows.

**Table 2: Demographic Characteristics of Sample Respondents**

<b>Variables</b>	<b>Categories</b>	<b>Frequency(n)</b>	<b>Percent (%)</b>
Sex	Male	99	57.2
	Female	74	42.8
	<b>Total</b>	173	100

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Age	25-34	46	26.6
	35-44	115	66.5
	45-54	12	6.9
	<b>Total</b>	173	100

**Source:** Own survey data, 2021

As presented in Table 2, among 173 respondents, the majority (57.2%) of sampled respondents were male. On the other hand, female sampled respondents accounted for 42.8%. This indicates that the number of male respondents exceeds their female counterparts.

The age of sampled respondents was one of the demographic variables; the majority (65.5%) was aged 35-44, and 26.6% were found in the 25-34 age categories. The remaining 6.9% were in the 45-54 age categories. This indicates that most sampled respondents were in the active age group.

**Table 3: *Socio-Economic Characteristics of Sample Respondents***

<b>Variables</b>	<b>Categories</b>	<b>Frequency(n)</b>	<b>Percent (%)</b>
Education level	1-8	7	4.0
	9-12	12	6.9
	Certificate	34	19.7
	Diploma	19	11.0
	Degree and above	101	58.4
	<b>Total</b>	173	100
Job title	Traffic police(officer)	31	17.9
	Transport expert	76	43.9
	Transport process owner	25	14.5
	Traffic police inspector	41	23.7
	<b>Total</b>	173	100
Work experience	6-10	62	35.8
	11-15	89	51.4
	16-20	12	6.9
	21-25	10	5.8
	<b>Total</b>	173	100

**Source:** Own survey, 2021

The study result indicated that most respondents were degree and above holders. The results in Table 3 indicated that 58.4% of respondents had a degree and above, 19.7% had a certificate, and 11% had a diploma. The rest, 6.9% and 4% of respondents, attended up to grades 9-12 and 1-8, respectively.

In line with the job title, 43.9% of sampled respondents engaged in transport experts, followed by transport process owners and leaders. The remaining 23.7% and 17.9% of the respondents were traffic police inspectors and traffic police (officers), respectively.

Regarding the work experience of sampled respondents, the result presented in Table 3 indicated that 51.4% of sampled respondents had regulated for 11 to 15 years, the next group consisted of 35.8% who had served for 6 to 10 years, 6.9% of the respondents stated that they served for 16-20 years, and the last 5.8% of the sample served as per the regulation and driven for 21-25 years. This indicates that sampled respondents had experience in their work and familiarity with road traffic accidents.

### **Descriptive Summary of Study Variables**

Under this topic, the questions collected using *Likert* scale items were analyzed. To make the analysis easy, the researcher used Al-Sayaad, Rabea, and Samrah's (2006) proposed techniques of mean score ranges and summarized in Table 4 as follows:

**Table 4: Mean Score Range for Five Scale Likert's Response**

<b>Mean</b>	<b>Response</b>
1.00 - 1.80	Strongly Disagree
1.81 - 2.60	Disagree
2.61 - 3.40	Neutral
3.41 - 4.20	Agree
4.21 - 5.00	Strongly Agree

**Source:** Al-Sayaad *et al.* (2006)

As seen from Table 4, the ranges of values were presented as *disagreeing* if the mean score is between 1.00 and 2.60, *neutral* if the mean score is between 2.61 and 3.40, and *agree* if the mean score is above 3.41. Based on these classifications the interpretations of all *Likert* scale items such as speedy driving, drunken driving, distracting driving, road users' neglecting, and road traffic accidents were presented as follows:

**Table 5: Descriptive Statistics**

Items	N	Mean	Std. Deviation
<b>Speedy Driving Variables</b>			
Drivers use over-speeding while driving.	173	3.66	1.113
Drivers did not respect the speed limit of the city.	173	3.53	1.203
Drivers did not use the appropriate speed based on their category of vehicles.	173	3.69	1.159
Drivers increase their speed without considering the traffic movement.	173	3.87	1.189
Drivers drive at high speed in adverse road weather conditions.	173	4.22	.945
<b>Drunken driving Variables</b>			
Drivers use alcohol while driving.	173	3.82	1.088
Drivers use psychoactive substances/ drugs while driving.	173	4.39	.980
driving errors while impaired by alcohol or drugs	173	4.09	1.148
Drivers fail to abide by the law prohibits while drunk-driving	173	3.92	1.464
<b>Distractive Driving</b>			
Drivers use a mobile phones while driving.	173	3.88	1.240
Drivers did not obey traffic control devices to ensure the safety of others.	173	4.01	1.296
Drivers drive without keeping a safe distance from other vehicles	173	3.58	1.514
Drivers drive without showing warning signals such as stop, give way, etc.	173	4.01	1.349
Drivers did not use seatbelts and safety devices.	173	3.34	1.495
<b>Road Users</b>			
Drivers' negligence toward pedestrians crossing or walking on the side of the road	173	3.48	1.242
People use walking along the streets relative to the oncoming vehicle.	173	3.88	1.063
People do not give way/priority to vehicles as required by law.	173	3.66	1.138
Pedestrians walk on the vehicle way.	173	3.77	1.178
Pedestrians' negligence for care and traffic law.	173	3.50	1.425

**Source:** Survey data, 2021

As summarized in Table 5, the overall mean or average value of speedy driving is 3.79, with a standard deviation of 0.458. This showed that the mean value is greater than 3.4, which relied on the agreement level based on Al-Sayaad *et al.* (2006) proposed techniques of mean score ranges for five-point Likert scale questions. Therefore, the sampled respondents in the study area agreed that drivers use high speeds beyond their limit. As a computed result, the vehicle speed is a significant determinant of RTAs risk. The risk could determine both for the occupants of vehicles in crashes and for pedestrians struck by vehicles. However, speed control is one of the more readily controllable factors affecting pedestrian injury in the city. The focus group participant also confirmed that speedy driving is the leading cause of road traffic crashes.



As presented concerning drivers, the result implied that most sampled respondents agreed that drivers use over- speeding while driving. In line with this, drivers did not respect the city's speed limit as the traffic law prescribes. In addition, the presented result inferred that drivers needed to use the appropriate speed based on their category of vehicles. Concerning the result, it indicated that drivers increase their speed without considering the traffic movement, driving at high speed in adverse road weather conditions.

As presented in Table 5, the overall average value of drunken driving is 4.05, with a standard deviation of 0.552. This showed that the mean value is greater than 3.4, which relied on the agreement level based on Al-Sayaad *et al.* (2006) proposed techniques of mean score ranges for five-point Likert scale questions. Therefore, the sampled respondents in the study area agreed that drivers usually drive under the influence of alcohol or other drugs to a level that renders the driver incapable of operating a vehicle safely.

The result implies that efforts to combat drinking and driving have been a cornerstone of road safety in the city. The computed evidence indicates that it should be a priority in the city to combat the growing RTA. It can be inferred that almost all indicated high rates of alcohol involvement regarding the extent of drinking and driving on their roads. In addition, it depicts that the drivers use psychoactive substances/drugs while driving. As a result, the mean value of driving errors while impaired by alcohol or drugs is very high. These make drivers negatively motivated to drive at high speed in adverse road weather conditions and inappropriate speed, neglecting the traffic law, which exposes the vehicle to collide with other vehicles or objects. Because of impairment with alcohol, drivers lose their consciousness and fail to abide by the law prohibiting while drunk-driving in Hawassa city.

The results of Table 5 indicate that the overall average value of distracted driving is 3.71, with a standard deviation of 0.582. This showed that the mean value is more significant than 3.4, which relied on agreement level based on Al-Sayaad *et al.* (2006) proposed techniques of mean score ranges for five-point Likert scale questions. Therefore, the sampled respondents in the study area believed that drivers engaging in other activities distract the driver's attention away from the road without considering the safety of the driver, passengers, pedestrians, and people in other vehicles.

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National Highway Traffic Administration (NHTSA, 2020) verified that thousands of people are killed and estimated that additional millions are injured in motor vehicle crashes involving distracted drivers. The result also indicates an average value of 3.71, meaning that most of the accidents are caused due to drivers' operating mistakes. Drivers involved in fatal crashes were reported as distracted at the time of the crashes.

As presented in Table 5, the overall average value of road users neglecting is 3.70 with a standard deviation of 0.553. This showed that the mean value is more significant than 3.4, which relied on agreement level based on Al-Sayaad *et al.* (2006) proposed techniques of mean score ranges for five-point Likert scale questions. This means many lose their lives as they would on any given day to their various activities like school, work, places of worship, and others. This result presents data on the number of pedestrians relinquished and abducted for death in road traffic crashes in Hawassa city due to defiance of traffic law.

It also presents the perception and information on the demographic and socio-economic characteristics of people exposed to injury or lost their lives as pedestrians and the costs of pedestrian road traffic crashes in the study area. It is mainly because of exposure by negligence, either inappropriate facilities for road users or loss of self-safer responsibility in keeping traffic regulations. It also infers that road users need to be on the safe side because of neglecting traffic rules and regulations. On the other hand, it persuades that the critical risk factors for pedestrian injury are driver's acts on speed, alcohol, lack of road infrastructure, and inadequate visibility of pedestrians on roads.

As the result of computed analysis, pedestrians and road users are the most reckless road system users in Hawassa city. That is because they are not subject to any accrediting procedure. They are under few legal restrictions. On the other hand, the issue is more complicated because road users' behavior is more unpredictable in determining traffic rules' observation, and they are most commonly involved in accidents. They can be categorized as children, including street children, older people, those with high blood alcohol levels or wrathful, and people with a mental disorders.

The computed result revealed that one of the significant and unleashed factors is that people use walking along the streets relative to oncoming vehicles in Hawassa city, and people need to give

way/priority to vehicles as required by law. In addition, the analysis verified that pedestrians walk on vehicle ways or pedestrian negligence for care and traffic law in Hawassa city.

**Table 6: Descriptive Statistics**

<b>Road Traffic Accidents</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
In the city, RTA claimed the destruction of property.	173	4.32	1.200
In the city, RTA claimed injuries.	173	4.01	1.358
In the city, RTA claimed the lives of people.	173	3.34	1.507
In the city, RTA is increasing from time to time.	173	3.47	1.246

**Source:** Survey data, 2021

Table 6 indicates that the overall average value of road traffic accidents is 3.78, with a standard deviation of 0.437. This showed that the mean value is more significant than 3.4, which relied on agreement level based on Al-Sayaad *et al.* (2006) proposed techniques of mean score ranges for five-point Likert scale questions. The result implies that the majority of sampled respondents agreed that in the city, RTA is increasing from time to time, claimed to have caused the destruction of property, caused injuries, and taken people's lives. This result verified the reported evidence from the study area that property damage accounts for 195% per year (SRTRDB, 2021). The computed result ensured that the most RTA effect on Hawassa city property loss, followed by injuries, resulted from RTA. The presented data showed that RTA is occasionally increasing, destructing the socio-economy life of victims and their families.

### **Inferential Analysis**

#### **Correlation Analysis**

In this section, the independent variables (speedy driving, drunken driving, distracting driving, road users' neglect, and road traffic accident) were analyzed one by one using correlation analysis in order to identify their individual relationship with the dependent variable (road traffic accident). The possible values of correlation coefficients range from  $-1$  (a perfect negative relationship) to  $+1$  (a perfect positive relationship) or a direct relationship between two variables. A value of 0 indicates no linear relationship between the two variables (Kothari, 2004). To know the strength and type of correlation between dependent and independent variables, Table 7 is set as a rule of thumb for the discussion of variables.

**Table 7: Rule of Thumb for the Strength of Correlation of Coefficient**

Range of Coefficient	Description of Strength
±.81 to ±1.00	Very strong
±.61 to ±.80	Strong
±.41 to ±.60	Moderate
±.21 to ±.40	Weak
±.00 to ±.20	None

**Source:** Bhattacharjee (2012)

Table 7 shows the individual relationship between a road traffic accident and human-related factors considered in the study, such as speedy driving, drunken driving, distracted driving, road users' neglect, and road traffic accident.

**Table 8: Correlation Analysis Result**

		Speedy driving	Drunken driving	Distracted driving	Road users' neglect	Road traffic accident
Speedy driving	r	1				
	n	173				
Drunken driving	r	.554**	1			
	Sig.	.000				
	n	173	173			
Distracted driving	r	.507**	.534**	1		
	Sig.	.000	.000			
	n	173	173	173		
Road users neglecting	r	.460**	.429**	.506**	1	
	Sig.	.000	.000	.000		
	n	173	173	173	173	
Road traffic accident	r	.632**	.620**	.843**	.575**	1
	Sig.	.000	.000	.000	.000	
	n	173	173	173	173	173

\*\*Correlation is significant at the 0.01 level

**Source:** SPSS output, 2021

Table 8 presents the correlation analysis showing that speedy driving has a positive and statistically significant association with road traffic accidents ( $r = 0.632$ ,  $p < 0.01$ ). This indicates that speed driving is strongly associated with road traffic accidents. Likewise, drunken driving has a positive and statistically significant relationship with road traffic accidents ( $r = 0.620$ ,  $p < 0.01$ ). Similarly, distracted driving has a positive and statistically significant relationship with road traffic accidents ( $r = 0.843$ ,  $p < 0.01$ ). Finally, the results of the correlation analysis showed that road users' neglect has a positive and statistically significant relationship with road traffic accidents ( $r = 0.575$ ,  $p < 0.01$ ). Based on Bhattacharjee's (2012) rule of thumb, the result implies

that independent variables have a moderate correlation to each other; however, they have a moderate, strong, and very strong relationship to the dependent variable.

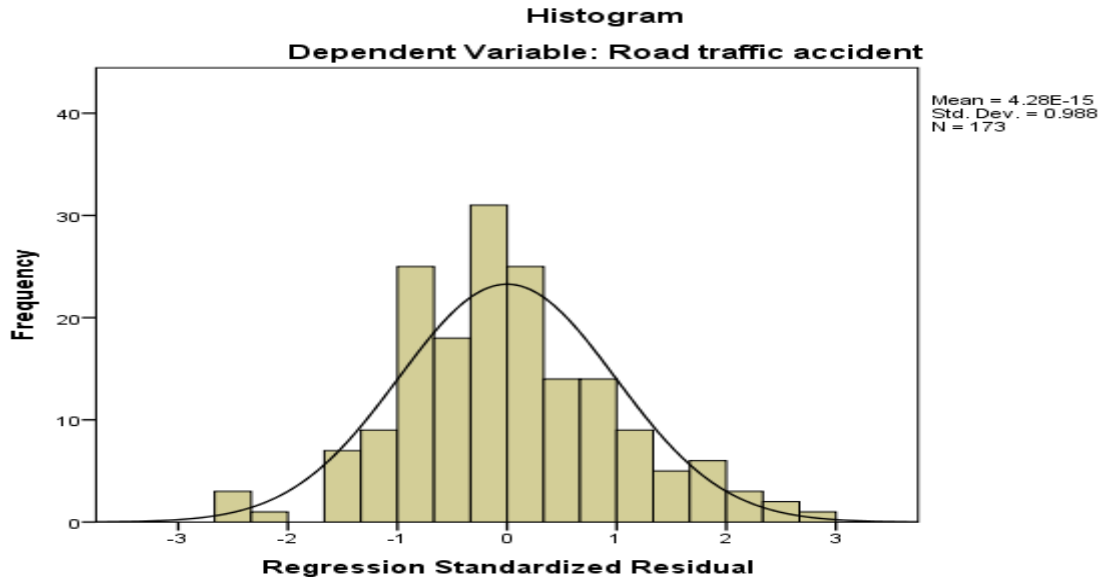
### **Regression Analysis**

In this study, multiple linear regression analysis is applied since it facilitates the evaluation of the level of effect that multiple independent variables that cause a particular dependent variable. Before applying regression analysis to test the effect of human-related factors on road traffic accidents, normality, linearity, and multicollinearity tests are made to identify misspecification of data, if any, to fulfill research quality as follows:

### **Normality Test**

The important diagnostic test conducted in this paper is the normality assumption. The normality assumption is that the mean of the residual is zero. Therefore, the researcher used a graphical method to test the normality of the data. The histogram result is presented as follows:

**Figure 2: Frequency Distribution of Standardized Residual**



**Source:** Model Output, 2021

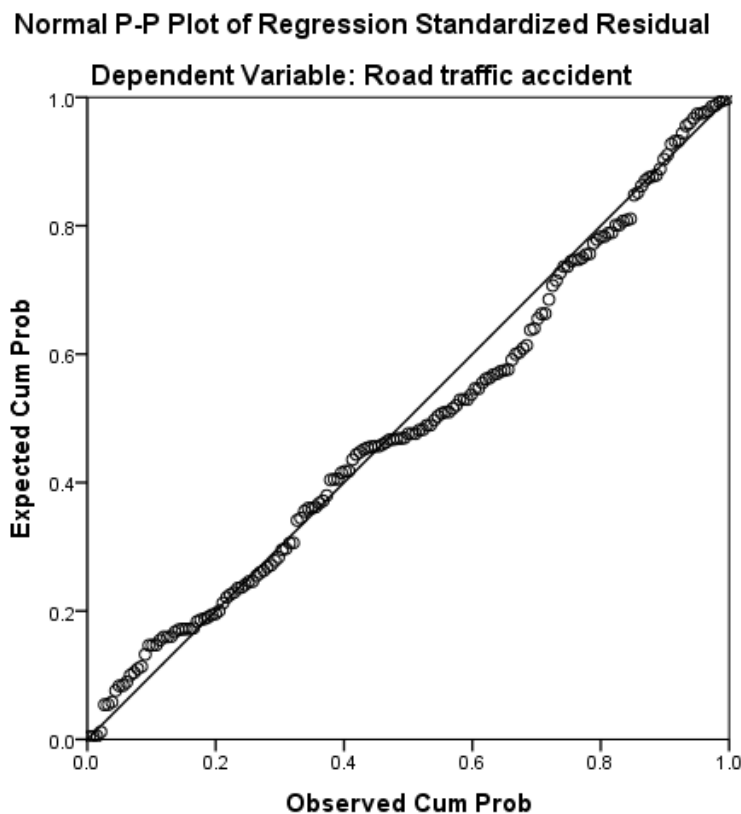
Figure 2 shows that the distribution is a standard curve, indicating that the data confirms the normality assumption. That means the residuals are normally distributed around its mean of zero

and become bell-shaped. Thus, no violations of the assumption of normally distributed error terms.

### Linearity Test

Linearity refers to the degree to which the change in the dependent variable is related to the change in the independent variables. Therefore, the results of the linearity test are presented in Figure 3.

**Figure 3: The Linearity Test of Standardized Residual**



**Source:** Model Output, 2021

To determine whether the relationship between the dependent and independent variables is linear, plots of the regression residuals through SPSS software were used. The scatter plot of residuals shows no significant difference in the spread of the residuals, as seen from left to right in Figure 3. This result suggests that the predicted relationship is linear. Similarly, the figure shows the distribution of residuals around its mean of zero. Hence the linearity assumption is

fulfilled as required based on the above figure. Therefore, it is possible to conclude that the researcher's inferences about the population parameter from the sample are valid.

**Multicollinearity Test**

Under this section, multicollinearity tests were checked using the variance inflation factor (VIF) and tolerance in Table 9.

**Table 9: Multicollinearity Assumption**

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Speedy driving	.603	1.658
Drunken driving	.598	1.673
Distracted driving	.592	1.690
Road users neglecting	.677	1.477

**Source:** Model Output, 2021

Collinearity statistics is associated with the extent of correlation between independent variables. Suppose there is a high correlation between two independent variables. In that case, the regression model assumes redundancy of one of these variables that the significance of it becomes too low and its coefficient also be negatively affected. The problem is checked by Tolerance and Variance Inflation Factor (VIF). A tolerance of  $>.10$  and a VIF of  $< 10$  are considered good enough to minimize the effect of multicollinearity (Miller & Whicker, 1999). Thus, the result implies that the regression model is unaffected by the higher correlation between two independent variables.

**Table 10: Results of Regression Analysis Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.889	.790	.785	.20250

a. Predictors: (Constant), Road users neglecting, Drunken driving, Speedy driving, Distracted driving

b. Dependent Variable: Road traffic accident **Source:** Model Output, 2021

According to the model summary of multiple linear regression analysis, the R-value of the model as per Table 10 was 0.889, which shows the highest degree of relationship between independent and dependent variables. The  $R^2$  value of the regression model was 0.785, indicating that 78.5% of the variance in road traffic accidents in Hawassa city was accounted for by speedy driving,

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drunken driving, distracted driving, road users' neglect, and road traffic accident. The remaining 21.5% of the variance in road traffic accidents in Hawassa city was accounted for by other variables not included in the study.

**Table 11: Results of ANOVA Output**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	25.903	4	6.476	157.919	.000
	Residual	6.889	168	.041		
	Total	32.792	172			

**Source:** Model Output, 2021

The ANOVA (Table 11) indicated that the multiple regression model is statistically significant or insignificant. Because  $R^2$  is not a statistical significance test (it only measures explained variation in Y from the predictor Xs), the F-test is used to test whether or not  $R^2$  could have occurred by chance alone. The results of the output found in the ANOVA table show that the model is statistically significant when speedy driving, drunken driving, distracted driving, road users' neglect, and road traffic accident are included ( $F=157.919$ ,  $p<0.001$ ). Therefore, the overall equation is found to be statistically significant.

**Table 12: Results of Multiple Linear Regression Analysis**

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	SE	Beta		
1	(Constant)	.603	.144		4.175	.000
	Speedy driving	.182	.043	.191	4.190	.000
	Drunken driving	.108	.036	.137	2.997	.003
	Distracted driving	.460	.034	.614	13.347	.000
	Road users neglecting	.093	.034	.117	2.727	.007

**Note:** B= Regression coefficient (Estimate), Std. Error = Standard Error, Dependent variable = Road traffic accident

**Source:** Model Output, 2021

Based on Table 12, using “ $\beta$ ” (unstandardized) coefficients, the regression equation of the research model becomes in the form indicated as follows.

Road traffic accident = 0.603 + 0.182\* Speedy driving + 0.108\* Drunken driving + 0.460\* Distracted driving + 0.093\*Road users neglect + e. Four variables were included in the model, and all predictors have found to have a significant effect on the road traffic accident in Hawassa city. These variables are speedy driving, drunken driving, distracted driving, neglect of road



users, and road traffic accidents. The regression equation is interpreted in the following paragraphs.

According to Table 12, speedy driving has a positive and significant effect on road traffic accidents in Hawassa city. The results of the regression coefficient ( $\beta = 0.182, p < 0.01$ ) indicate that a one-unit increase in speedy driving brings a 0.182-unit increase in road traffic accidents in Hawassa city. This indicates that speedy driving increases road traffic accidents. In corresponding to this finding, WHO (2018) verified an accepted principle that every 1% increase in mean speed produces a 4% increase in the fatal crash risk.

In connection to drunken driving, Table 12 shows that drunken driving positively and significantly affects road traffic accidents in Hawassa city. The results of the beta coefficient and p-value ( $\beta = 0.108, p < 0.01$ ) indicate that drunken driving increases road traffic accidents by 0.108-unit due to a one-unit increase in drunken driving.

Alcohol consumption results in impairment, which increases the likelihood of a crash. Because it produces poor judgment, increased reaction time, and lowers vigilance and visual acuity. Therefore, impairment by alcohol is an important factor influencing both the risk of a road traffic crash as well as the severity and outcome of injuries that result from it.

Table 12 shows that distracted driving positively and significantly affects road traffic accidents in Hawassa city. Additionally, the result of the beta coefficient indicates that a one-unit increase in distracted driving leads to a 0.460-unit increase in road traffic accident ( $\beta = 0.460, p < 0.01$ ) s. The findings of Lipovack and others (2017) also approved that distracting driving is a growing risk factor linked to severe adverse outcomes. Driver's reaction times have also been shown to be 50% slower with mobile phone use than without. The interviewee and focus group participants also confirmed that drivers use mobile phones while driving and talk with passengers, which may affect their caution.

As Table 12 shows, road users' neglect positively and significantly affects road traffic accidents in Hawassa city. The results of the beta coefficient ( $\beta = 0.093, p < 0.001$ ) indicate that a one-unit increase in road users' neglecting leads to a 0.093 unit increase in road traffic accidents.

### Hypothesis Testing

The hypotheses proposed in this study concerning the effect of human factors on road traffic accidents in Hawassa city were analyzed in this section. The hypothesis is accepted or rejected based on the understanding obtained from the coefficient table. Accordingly, the hypotheses proposed in this thesis are analyzed as follows:

**Table 13: Results of Hypothesis Test**

Hypothesis	Statement	Result
1	<b>H<sub>1</sub></b> : Speedy driving has a significant effect on road traffic accidents.	Accepted
2	<b>H<sub>2</sub></b> : Drunken driving has a significant effect on road traffic accidents.	Accepted
3	<b>H<sub>3</sub></b> : Distracted driving has a significant effect on road traffic accidents.	Accepted
4	<b>H<sub>4</sub></b> : Road users' neglect has a significant effect on road traffic accident	Accepted

**Source:** Own survey, 2021

### Summary

The study's major finding related to the research objectives is summarized with the help of the findings computed in the study. The study's main objective was to examine human factors' effects on RTAs in Hawassa city. Under the main objective, the research intended to attain two specific objectives. They are investigating the human road interactions that contribute to the occurrence of RTAs and identifying the major human factors that contribute to the occurrence of RTAs.

This research has used a cross-sectional research design to obtain pertinent information concerning the recent experience of human factors that affect road traffic accidents. A combination of the qualitative and quantitative approaches is used in the research to provide a variety of perspectives that can be studied. Simple descriptive analyses (mean, standard deviation, and others) were carried out to analyze the effect of human factors on RTAs in the study area. The researcher also used inferential statistics and multiple linear regression analysis to evaluate the level of effect that multiple independent variables cause a particular dependent variable. The human road interactions that contribute to the occurrence of RTAs in Hawassa City are discussed as follows.

The study considers the interactions such as speedy driving, drunken driving, distracted driving, neglect of road users, and road traffic accidents. The correlation analysis shows that speedy driving has a positive and statistically significant association with road traffic accidents ( $r = 0.632, p < 0.01$ ). This indicates that speed driving has a strong association with road traffic accidents. Likewise, drunken driving has a positive and statistically significant relationship with road traffic accidents ( $r = 0.620, p < 0.01$ ). Likewise, distracted driving has a positive and statistically significant relationship with road traffic accidents ( $r = 0.843, p < 0.01$ ). Finally, the results of the correlation analysis showed that road users' neglect has a positive and statistically significant relationship with road traffic accidents ( $r = 0.575, p < 0.01$ ). The result implied that independent variables have a moderate correlation to each other but have a moderate, strong, and very strong relationship with the dependent variable.

In order to identify the main human factor contributing to RTAs in Hawassa city, an analysis carried out by multiple logistic regression analysis revealed four factors that significantly increase the risk of RTA in Hawassa city. The study explored that human factors are sufficiently considered in road traffic safety systems. Human factors that speedy driving, drunken driving, distracted driving, and road users' neglect have been identified to account for the occurrence of RTAs in Hawassa city. Additionally, understanding how human factors are incorporated into road safety systems would help reduce the most significant contributing factor to RTAs.

Speedy driving positively and significantly affects road traffic accidents in Hawassa city. The regression coefficient  $\beta = 0.182, p < 0.01$  indicates that a one-unit increase in speedy driving brings a 0.182 unit increase in road traffic accidents in Hawassa city. Using exceeded speed can affect other road users. The pedestrian may mistakenly assume it is safe to cross the road, attempt to do so, and get struck by the vehicle.

This finding indicates that exceeding the limit speed increases RTA risk. It can be concluded that speeds greater than the set speed by the traffic law do compromise safety. The effect on crash risk comes mainly from the relationship between speed and stopping distance. The higher the speed of a vehicle, the shorter the time a driver has to stop and avoid a crash, including hitting a pedestrian.

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In connection to drunken driving, it has a positive and significant effect on road traffic accidents in Hawassa city. The results of the beta coefficient and p-value ( $\beta = 0.108, p < 0.01$ ) indicates that drunken driving increases road traffic accidents by 0.108 unit due to a one-unit increase in drunken driving.

The finding shows that distracted driving positively and significantly affects road traffic accidents in Hawassa city. Additionally, the result of the beta coefficient indicates that a one-unit increase in distracted driving leads to a 0.460-unit increase in road traffic accidents ( $\beta = 0.460, p < 0.01$ ).

On the other hand, road users' neglect has a positive and significant effect on road traffic accidents in Hawassa city. The results of the beta coefficient ( $\beta = 0.093, p < 0.001$ ) indicate that a one-unit increase in road users' neglect leads to a 0.093-unit increase in road traffic accidents.

Four variables were included in the model, and all predictors have significantly affected road traffic accidents in Hawassa city. These variables are speedy driving, drunken driving, distracted driving, and road users' neglect. According to the model summary of multiple linear regression analysis (the R-value) is 0.889. This shows the highest degree of relationship between independent and dependent variables. The  $R^2$  value of the regression model was 0.785, indicating that 78.5% of the variance in road traffic accidents in Hawassa city was accounted for by speedy driving, drunken driving, distracted driving, road users' neglect, and road traffic accident.

Therefore, the effects of human error are found to be most significant (78.5%) compared to defects in vehicles, road design, road conditions, and weather conditions. The remaining 21.5% of the variance in road traffic accidents in Hawassa city was accounted for by other variables not included in the study. The theoretical underpinnings supported that human errors directly cause an accident resulting in injury or loss. Events that are or were caused by consistent human error lead to an accident.

### **Conclusion**

This study analyzes typical human risk factors contributing to traffic accident occurrence in Hawassa city. RTA analysis provides a comprehensive view of the factors mean speed, drunken driving, distractive driving, and pedestrians or road users' neglect involved in an accident.

Reducing risk through speed management requires a good understanding of road functions. Speed limiting is very crucial in this concern. Therefore, technological and mechanical speed breakers must be part of the solution. Driver performance and driver behavior are also the most significant challenges to improving road safety. Therefore, this must be part of the curriculum when training is provided to issue driving licenses. Accessing proper infrastructure is equal to developing appropriate human resources and needs in-depth knowledge and information about bringing change. Likewise, increased enforcement of traffic laws and restrictions needs to be improved to minimize RTA. It is also necessary to deal with pedestrian behavior as a preventive measure and review existing infrastructure to combat the effects of RTA. Based on this result, it can infer that improper pedestrians and other road users form the most critical safety factor in the highway and streets of Hawassa city.

The factor of human error is found to be the most significant (78.5%) compared to defects in vehicles, roads, or weather conditions, similar to other studies like Pradeep Kumar (2020). The study pointed out apparent gaps in maintaining the restriction on exceeded speedy driving, impaired with alcohol and psychoactive substance while driving, distracted driving, and road user negligence are bases for increased RTAs which could result in crashes, injuries, and mortality while entailing property damages. The problems can be categorized as behavioral or measly aptitudes to respect traffic laws and inappropriate infrastructures (roadway) (WHO, 2018).

### **Recommendations**

Based on the research findings, the researcher recommends targeted actions and increased awareness of the people to achieve behavioral change and restricted control of traffic law, in addition to appropriate infrastructure and development of human resources to tackle the RTAs' lifting-up challenges. Based on the key associated risk factors of RTAs, there is a need for developing, designing, and implementing comprehensive measures to improve road traffic safety. Thus, the study pointed out sustainable solutions to improve the traffic situation in Hawassa city. The solutions as per identified problems are advocated as follows:

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- Infrastructure facilities and traffic control mechanisms that separate pedestrians from motor vehicles and enable pedestrians to cross roads safely are essential to ensure pedestrian safety, complementing vehicle speed and road system management.
- The resilient intervention efforts need existing public awareness to improve the traffic situation, engage public participation, and intensify legal and educational activities, including curriculum revision.
- Furthermore, an entire field of traffic system engineering should be committed to speed control through laws, enforcement, education, and speed breakers. This might include roadside surveys using an alcohol tester, speed limiter, and Global Positioning System (GPS) technology.
- Identify and assess policies, institutional settings, and capacity building relating to road safety management and review existing regulations, manuals, and directives that could curb the current situation of RTAs. Strengthening and projecting transport modernization and ICT solution system were suggested for better safety enhancement.

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