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ROAD TRAFFIC ACCIDENT CAUSE AND EFFECT ON SOCIO ECONOMY OF ADDIS ABABA CITY

Teferi Girma Bekele
Faculty/Department: Research and plan, Addis Ababa, Hayahulet Mazoria

Abstract *The study provides empirical indication on the road traffic accident cause and effect on socio economic of Addis Ababa city. The purpose of the study is to identify the main cause of road traffic accident in Addis Ababa, to look challenges of road safety and to forecast the impact of traffic accident on both human life and property. The study utilizes descriptive statistics like maximum, minimum, percentage, graphs and charts. And also the study employs VAR model to identify the main cause of traffic accident interims of human death, human injury, and property damaged. The road traffic accident effects are human death, human injury and human property damaged. It is challenges to least developed countries specially sub Saharan African. Traffic accident kills above 450 people annually in Addis Ababa and the study forecast that Addis Ababa will loss above 600 million birr in next five years if the challenge is not combat. For this problem speed takes the first role, the next is pedestrian fault. Road damage, drug user driver and their ethics has also the big impact on road safety and flow in Addis Ababa. The road carnage has severe impact on the human, social and economic development. The study finding could stimulate discussion and to inform policy makers in traffic safety policy formation. Education road use for passenger and driver, enforcement, differentiating pedestrian road from car road by traffic management are ultimately recommended.*

Keywords*: Road traffic, accident, education, enforcement, VAR Model*

Introduction

1.1. Background

Road traffic accident is the major cause of human injury, human death and economic resources loss all over the world. About 1.35 million deaths occur each year worldwide due to road traffic accidents which of about 70 percent of the deaths occur in developing countries. The literature indicated that 23 percent of the deaths involve pedestrians, out of which 35 percent are children. The pedestrian are killed without any business with the car and the new generation countries coming hope were died due to the car accident. Because of traffic accident many countries loss their future opportunities of development (WHO, 2018).

Developing countries bear the brunt of the fatalities and disabilities from road traffic accident, accounting for more than 85% of the world's road fatalities, and about 90% of the total disability adjusted life years lost due to road traffic injuries. The problem is increasing in these countries at a fast rate. From daily 1040 total death in this world 650 are African while it is declining in all industrialized nations like Western Europe, North America, Japan, Australia and New Zealand(WHO, 2017). The annual cost of road accident is in excess of US $871 billion, and in the developing world the estimated cost is about US $110 billion each year. Due to the scarcity of costing data for African countries, it is difficult to make a precise cost of road crashes in Sub- Saharan Africa. The current estimate of costs of crashes in the continent is US$ 3.7 billion per year, of which South Africa alone accounts for 2 billion. However, the estimated costs as a percentage of the national Gross National Product (GNP) in most African countries range from about 0.8% in Ethiopia and 1% in South Africa to 2.3% in Zambia and 2.7% in Botswana to almost 5% in Kenya [Osoro, 2014].

In Sub-Saharan Africa traffic accident is very high. Countries like Namibia, Sudan, Congo, Malawi and Central Africa account for most of the reported deaths. In last twenty years South African figure of over 9,000 has been consistent over time, while

Nigeria with 6,185 deaths has declined from a high of over 9,200 in the early 1990s. Ethiopia, Kenya, Uganda, Tanzania and Ghana are the other countries that experience high numbers of road deaths only in Ethiopia annually above 5000 people are died do to traffic accident. Every year many properties are damaged, many people are injured, many children leave without parents and many elder leave without their son/ daughter by car accident (AARTMA, 2018, WHO, 2018).

Road traffic accident related causalities are extremely high in Ethiopia specially, in Addis Ababa is characterized by poor traffic control systems and regulations, overcrowded residential patterns, lack of good engineering systems which can help reduce the high traffic congestion. Besides absence of road safety organization concerned with coordinating the different offices in relation with roads, road traffic, and absence of modern road transport regulations and other factors have resulted in a high number of traffic accidents in the city (Teferi, *et al.*, 2018).

This study, deal with the cause and effect of road traffic accident on house holds' life in Addis Ababa city by employing descriptive statistics and VAR model to fill gaps of methodology of above researchers. Furthermore, the study looks deeply determinants of road traffic accident in terms of human death, human injury and property damaged. Therefore, this study tries to fill the gaps of above researches and recommend the way to reduce traffic accidents in Addis Ababa city.

1.2 Objective of the study

The general objective of the study is to examine the cause and effect of road traffic accident on house holds' life in Addis Ababa city, specifically

- To identify the main cause of road traffic accident in Addis Ababa.
- To look and forecast the impact of traffic accident on both human life and property.

1.3 Significance of the study

The study analyzes the entire cause and effect of road traffic accident on house holds' life in Addis Ababa city. So the finding of study assist academicians/researcher/ in broadening of the prospectus providing a deeper understanding of the critical issues of cause and effect of road traffic accident on house holds' life. City dwellers are also helpful from the findings of this study by looking the alternative way of moving in the road.

1.4 Scope of the study

Among the factors that affect the precision of any study, the availability and reliability of the information it employs is very important. This study mainly uses the information collected from Addis Ababa Traffic Police Traffic Accident Control and Inspection core process that is available for 23 years accident records which is from the years 1996-2018). The study also tries to observe the road accident, causes and assesses the control mechanisms of road traffic accident in Addis Ababa within twenty three years. Therefore, the study is restricted to assess the case of Addis Ababa along that line.

2. Literature review

2.1 Traffic accident in Africa

Road traffic accident is the series issue in Africa and it is from most killer disease. The numbers of road traffic injuries and deaths have been increasing from time to time. African Region had the highest rate of fatalities from road traffic injuries worldwide at 26.6 per 100 000 population. The increased burden from road traffic injuries and deaths is partly due to economic development, which has led to an increased number of vehicles on the road. Given that air and rail transport are either expensive or unavailable in many African countries, the only widely available and affordable means of mobility in the region is road transport. However, the road infrastructure has not improved to the same level to accommodate the increased number of commuters and ensure their safety and as such many people are exposed daily to an unsafe road environment (Abegaz, et, al 2014).

Most authorities emphasize speed as a primary cause of accidents, although most experts agree that speed alone rarely causes an accident. Some argue in favour of speed restrictions to mitigate the consequences of accidents, relying on Newton's law of momentum. That is, the outcome of an accident largely depends on the energy dissipated in a crash, and that energy rises as the square of velocity, according to the equation $E = 0.5mv2$, where E is the energy, m is the mass, and v is the velocity. "Speed kills" proponents may also argue that slower driving causes no harm. On the other hand, critics of the "speed kills" mentality claim that this argument ignores complex factors that influence accident outcomes, and thus fails to address the true causes of accidents.

A recent Global Road Safety Project (GRSP) study shows that about 10 per cent of global road deaths in 1999 took place in Sub-Saharan Africa where only 4 per cent of global vehicles are registered. Conversely, in the entire developed world, with 60 per cent of all globally registered vehicles, only 14 per cent of road deaths occurred. However, given the widely recognized problem of under-reporting of road deaths in Africa (like the rest of the developing world); the true figures are likely to be much higher, as the police reported road fatalities represent only the tip of the injury pyramid. According to this GRSP study, the adjusted true estimate of total road deaths for all Sub-Saharan African countries for the year 2000, based on the police department's records, ranges between 68,500 and 82,200. However, the estimated fatality figure of 190,191 for Sub-Saharan Africa presented in the 2004 World Report, based on health care data, is much higher, and reflects the magnitude of under-reporting in police statistics (Yazan, 2016).

According to Addis Ababa police reports of the total accidents in Addis Ababa have been caused by human errors. Of these accidents caused by human errors, drivers were also indicated as responsible for about 74 percent of the cases. Failure to give way for pedestrians, over speed and not moving at right distance were also the main reported and observed errors of drivers. The behavior of pedestrians is also causing loss of life and huge material damage. People in the city give little attention to traffic because of little experience and knowledge of a comprehensive traffic regulation and lack of awareness about how to safety act in the motor traffic system.

2.3 Empirical literature

A recent Global Road Safety Project (GRSP) study shows that about 10 per cent of global road deaths in 1999 took place in Sub-Saharan Africa where only 4 per cent of global vehicles are registered. Conversely, in the entire developed world, with 60 per cent of all globally registered vehicles, only 14 per cent of road deaths occurred. However, given the widely recognized problem of under-reporting of road deaths in Africa (like the rest of the developing world); the true figures are likely to be much higher, as the police Analysis of road traffic accidents in Addis Ababa: Traffic simulation reported road fatalities represent only the tip of the injury pyramid. According to this GRSP study, the adjusted true estimate of total road deaths for all Sub-Saharan African countries for the year 2000, based on the police department's records, ranges between 68,500 and 82,200. However, the estimated fatality figure of 190,191 for Sub-Saharan Africa presented in the 2004 World Report, based on health care data, is much higher, and reflects the magnitude of under-reporting in police statistics. (Chitere, *et al*,. 2012)

Much can be done to reduce the problem of road accident. Indeed, many high-income countries have been able to reduce their road traffic injury burden by up to 50 per cent over the last few decades. Despite the fact that the total number of reported accidents decreased the last few years, safety is one of the challenging issues in the transportation industry in Ethiopia The statistical accident rate model developed will include benchmark estimates of national rates of absolute accident risk by accident type and facility.

Traffic accident is the result of multiplicity of factors and it is often the interaction of more than one variable that leads to the occurrence of accident. Accidents occur as a result of the interaction of many different factors among which are road and traffic characteristics. Most investigations have revealed that 70% to 80% of all traffic accidents are due to human error. The term human error however is often controversial. It doesn't satisfactory describe that large number of injuries and deaths that occurs on the road as the result of driving errors while abilities to do so are impaired by alcohol or drugs, lack of experience, lack at distribution of attention (Chen, 2009).

3 Methodology

3.1 Descriptive Statistics

Here the research analyzes qualitative data from focus group discussion and summary of traffic accident reports. The study uses different tools of analysis on descriptive statistics specially, percentage, average, maximum, minimum, specially charts and graphs.

To investigate the response of the traffic accident cause and effect fright in Addis Ababa, the study employs an econometric analysis of VAR co-integrated model using yearly data over the period 1996 to 2018 G.C. VAR methodology superficially resembles simultaneous-equation modeling in that we consider several endogenous variables together. But each endogenous variable is explained by its lagged, or past, values and the lagged values of all other endogenous variables in the model; usually, there are no exogenous variables in the model (Greene, 2012).

3.2 Econometrics Model Specification

The types of road traffic accident cause and effect are so many, it is difficult to summarize in one or two variables. According to World Health Organization report the cause of road traffic accident are categorized to 30 accident type. And the effect is also four different effects on human and property loss. So in order to solve these problems the Variance Auto Regressive Model is the best method. The nature of VAR model is combining different variables to one by adding simultaneously. So VAR model is the best model to combine different accident binary categories.

The models is specified as

Yi=F(X1, X2, … X10) ----------(1)

In this study Yi= simultaneously added different human injuries and human death

Xi= set of independent variables before and after simultaneously added

Yi=F(X1, X2, … X10) ----------(2)

In this study Yi= simultaneously added different property damaged

Xi= set of independent variables

3.3 Data Source

In order to realize the final target the study, researcher uses well-design focus group discussion and collect secondary data as best instrument. The focus group discussion is discussed with concerned pubic institution expertise. Secondary data all are obtained from the Addis Ababa Police Commission and Addis Ababa Road Traffic Management Agency Road Traffic Safety and Capacity Building. The philosophy of research post positivism knowledge privileges used for quantitative type research approach.

3.4 Diagnostic Test

Before fitting a multivariate time-series model, the research must specify the number of lags of the dependent variable to include. Varsoc produces statistics for determining the order of a VAR or VECM. Several post estimation commands perform the most common specification analysis on a previously fitted VAR or SVAR. The paper can use varlmar to check for serial correlation in the residuals, varnorm to test the null hypothesis that the disturbances come from a multivariate normal distribution, and varstable to see if the fitted VAR or SVAR is stable. Two common types of inference about VAR models are whether one variable Granger-causes another and whether a set of lags can be excluded from the model. Vargranger reports Wald tests of Granger causation, and varwle reports Wald lag exclusion tests.

The research can't conclude the results of regression analysis without taking into consideration a range of diagnostic tests for normality, goodness-to-fit. The diagnostic tests help to detect the inadequacy of the model and identify the strengths and weakness of the model. They also reduce the probability of wrongly rejecting or accepting the null hypothesis. In general, the diagnostic tests reduce the drawbacks by indicating problems associated with gives the summary of the diagnostic tests (Gujarati 2009).

4 Result analysis

4.1 Descriptive Analyses

The data shows us traffic accident in Addis Ababa is the serious issue that increases from time to time. Except in 2018 G.C death is increase with decreasing rate from year to year, other injuries and property damaged increase with increasing rate.

Figure 1. Traffic accident by type and its' effect

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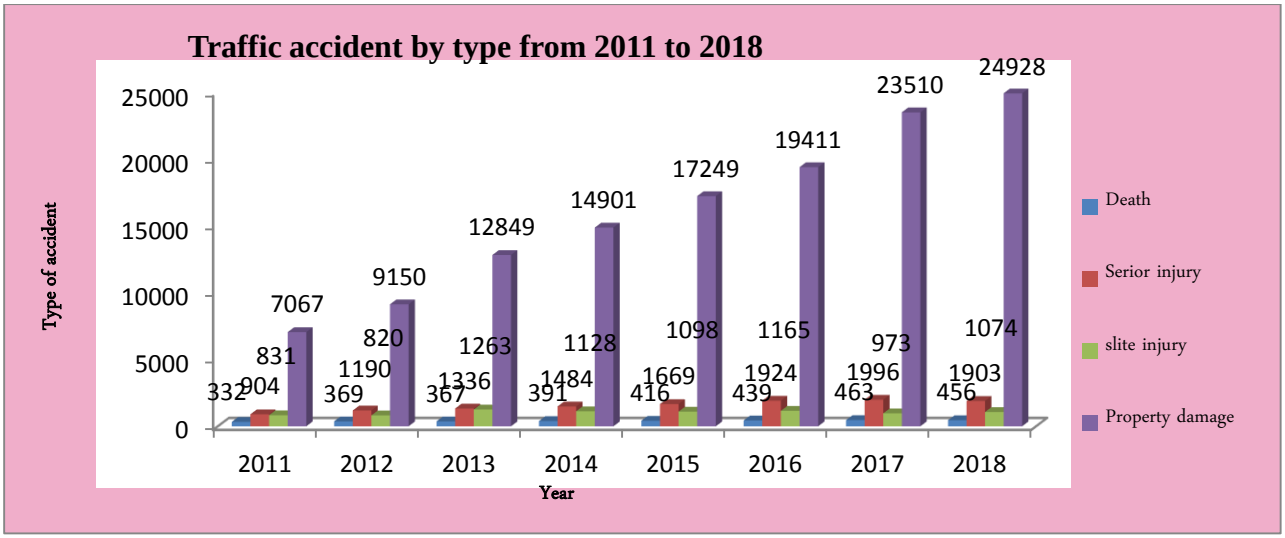
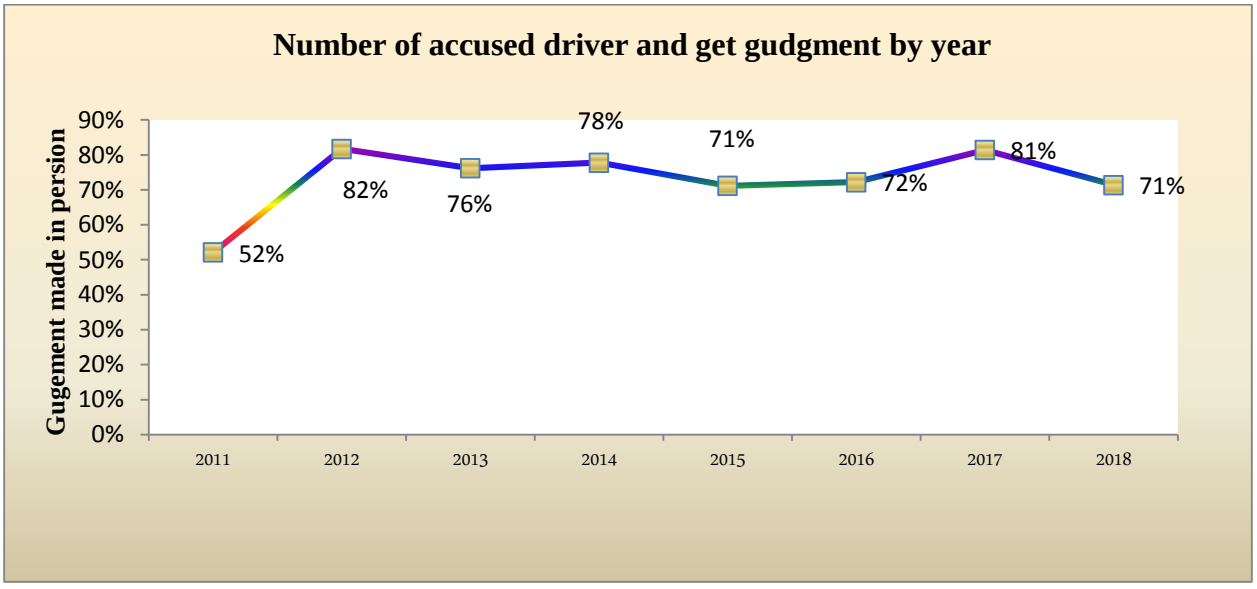


Source: ARTMA, 2018

The table shows us traffic accident in Addis Ababa is increase from time to time. Comparatively in 2018 year property damage increases above three times of initial 2011 year. Death and series injure seems to decrease when we compare accident in 2017 and 2018 this is due to different road safety institution work in Addis Ababa, other accident increase by fast rate. So Addis Ababa Road Traffic Management and other related institution should work as much as enough.

Figure 2.



The table shows that In year 2011 only 52% accused driver were get judgment. Only by the year 2012, 82% of accused driver were punished by other years many driver were not punished. This tells us there were law breaker expertise and driver by corruption. Rule of law are not prevent and the sector are not enforce the rule.

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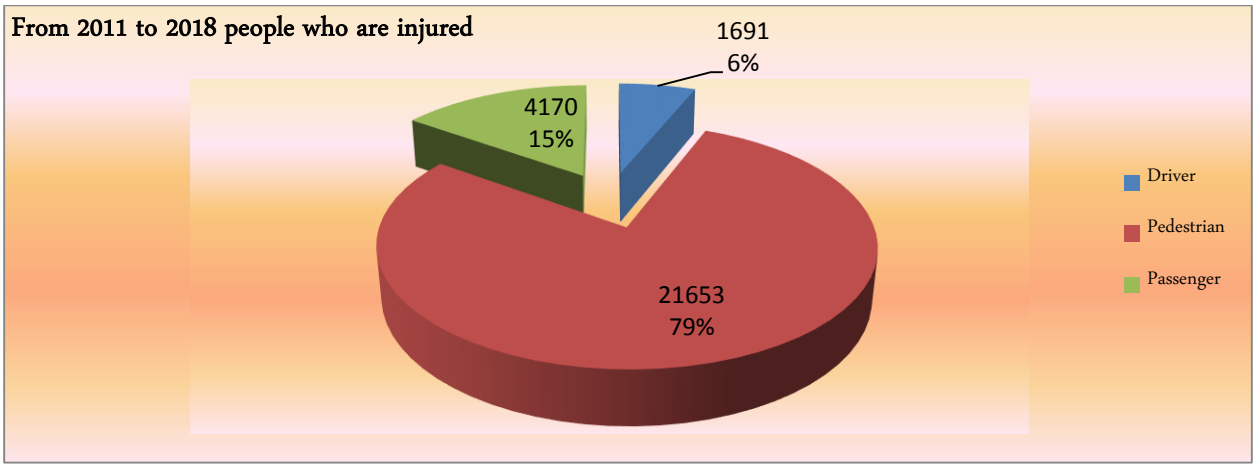
Figure 3. From 2011 to 2018 people who are injured



The diagram reveals us the pedestrian are highly injured by these eight years. Out of 27514, 21653(79)%) were pedestrian followed by passenger whore where 4170(15%). The problem creator driver has the high probability to be saved.

5 Econometric Results and Analysis

The pre-estimation tests are conducted in order to identify the existence of spurious estimation outcomes as indicated by high R^2. The meaningless relationship among variables leads to the fact that the classical t and F tests cannot work well. Hence there are two concepts are being analyzed to have non- spurious estimation outcome: - Unit roots Test and Co Integration Analysis.

Road traffic injuries are a global problem affecting all sectors of society. To date, road safety has received insufficient attention at the national and regional levels. This has resulted in part from: a lack of information on the magnitude of the problem and its preventability; a fatalistic approach to road crashes; and a lack of the political responsibility and multidisciplinary collaboration needed to tackle it effectively.

5.1 Optimal lag length

The optimal number of lags is important for appropriateness of the model and determines the statistically significance level of explanatory variables and the forecasts. Table … gives alternative techniques of Akaike Information criterion (AIC); Schwarz Bayesian criterion (BIC), Hannan- Quinn criterion (HQC) and the log likelihood ratio (LR).

The log likelihood ratio suggests the order of lag is 3 as the probability of LR is small compared to the 5 percent level of significance. This is also confirmed by the AIC, BIC and HQC. Therefore, the paper uses an optimal lag length of 3 for testing stationarity of the time series and estimating the VAR model.

Table 1. Stationary test

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. varsoc

   Selection-order criteria
   Sample:  1993 - 2009                              Number of obs      =         17
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-92.1919				11593	12.0226	12.0713	12.5127
1	-92.1592	.06538	1	0.798	13972.3	12.1364	12.19	12.6755
2	-90.229	3.8604	1	0.049	13837.8	12.0269	12.0854	12.6151
3	-83.5373	13.383*	1	0.000	8143.25*	11.3573*	11.4207*	11.9945*
4	-83.0437	.98722	1	0.320	10586.6	11.4169	11.4851	12.1031
5	-82.9747	.13795	1	0.710	16259.7	11.5264	11.5995	12.2616

```
   Endogenous:  VAR00003
    Exogenous:  roadfay pedefay population drug technique violet pass speed
                other  _cons
```

5.2 Akaike Information Criterion (AIC) test

The Akaike Information Criterion (AIC) is a way of selecting a model from a set of models. The chosen model is the one that minimizes the Kull back-Leibler distance between the model and the truth. It's based on information theory, but a heuristic way to think about it is as a criterion that seeks a model that has a good fit to the truth but few parameters. It is defined as:

AIC = -2 (ln (likelihood)) + 2 K 3.74

where likelihood is the probability of the data given a model and K is the number of free parameters in the model. AIC scores are often shown as ΔAIC scores, or difference between the best model (smallest AIC) and each model (so the best model has a ΔAIC of zero).

The second order information criterion, often called AICc, takes into account sample size by, essentially, increasing the relative penalty for model complexity with small data sets. It is defined as:

AIC_c = -2 (ln (likelihood)) + 2 K * (n / (n - K - 1)) 3.75

where n is the sample size. As n gets larger, AICc converges to AIC (n - K -1) → n as n gets much bigger than K, and so (n / (n - K - 1)) approaches 1), and so there's really no harm in always using AICs regardless of sample size. In model selection in comparative methods, sample size often refers to the number of taxa (Butler and King, 2004; O'Meara et al., 2006).

5.3 Unit root test

A test of stationarity (or nonstationarity) that has become widely popular over the past several years is the unit root test. Most empirical evidences that exhibit stationary for ratio time series provide a suspect of the existence of structural break that affects the pattern of time series of the two variables.

5.4 Regression Results and Analysis for human death

At the optimal lag order of 3, the OLS estimates for the VAR system using the data 1996-2018 G.C are presented below in the following three equations. The inclusion of addition information of exogenous variables in the VAR model contributes for a better trend predictability compared with the simple VAR model.

The first equation in the VAR system indicates there is a strong accident interaction of the human death and property damaged with the human injury at different lags (Table 2)

As puts below tables all human injury, human death and property damaged VAR models are statistically significant and many independent variables have expected sign. When we look human death with some selected traffic accident causes pedestrians faulty variable is highly cause for human death. The result shows us when pedestrians or road users faulty increase in the road by ten persons, they cause for 66 persons to be died by traffic accident, other things remain constant.

Similar to pedestrian faulty variable drug has also positively and high relationship to human death by traffic accident. The result shows us when one hundred drug users driver increase in the driving, they cause for 112 persons to be died by traffic accident, other things remain constant.

The coefficient of technique faulty is also positively, high relationship to human death by traffic accident and statistically significant at 1%. The result reveals us when one hundred car

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with technical problem increase in the area, they cause for 102 persons to be died by traffic accident, other things remain constant.

The coefficient of other faulty is also positively, high relationship to human death by traffic accident and statistically significant at 5%. The result reveals us when one different problems other than listed here are created in the road, they cause for almost for one person to be died by traffic accident, other things remain constant.

Similar to listed above variables the coefficient of violating any rule has also positive and statistically significant at 5%.The VAR result shows us when ten different violating rule driver are increase in driving area, they cause for seven persons to be died by traffic accident, other things remain constant.

The coefficient of wrong pass is also positively, high relationship to human death by traffic accident and statistically significant at 5%. The result reveals us when one thousand drivers have the attitude to pass first in the road, they cause for twenty eight persons to be died by traffic accident, others things remain constant.

The coefficient of speed is also positively, high relationship to human death by traffic accident and statistically significant at 5%. The result reveals us when one thousand drivers have high speed in the area, they cause for twenty one persons to be died by traffic accident, others things remain constant.

The last and the least effect coefficient is population density which have also positively, slightly relationship to human death by traffic accident and statistically significant at 1%. The result reveals us when ten thousand peoples are increases in the city, they cause for eleven persons to be died by traffic accident, others things remain constant.

Table 2. Regression Results and Analysis for human death

VAR00003	Coef.	Std. Err.	z	P>z
VAR00003				
VAR00003				
L1.	-0.72817	0.248972	-2.92	0.003
L2.	-1.86879	0.650544	-2.87	0.004
L3.	-1.30876	0.281567	-4.65	0.000
L4.	-0.8633	0.937682	-0.92	0.357
L5.	0.129389	0.347659	0.37	0.71
population	0.001179	0.000263	4.49	0.000
Drug (alcohols and chat) user drivers	1.112098	0.426996	2.62	0.009
Any technical problem of the car	1.020115	2.389281	2.75	0.006
Violating any rule	0.700419	0.484434	2.45	0.048
Wrong pass	0.028986	0.040774	0.71	0.077
Over speed	0.821099	0.019173	2.15	0.071
Other cause	0.471243	0.630656	2.54	0.024
Pedestrian faulty	6.373501	2.060448	3.09	0.002
Road faulty	10.76511	69.47935	0.15	0.877
_constant	-1219.05	258.2549	-4.72	0

The result from variance auto regressive model shows us all variables are positively affect the injury and some of them are statistically significant on traffic accident like death and property damaged.

At the optimal lag order of 3, the OLS estimates for the VAR system using the data 1996-2017 G.C are presented below in the following three equations. The inclusion of addition information of exogenous variables in the VAR model contributes for a better trend predictability compared with the simple VAR model.

The first equation in the VAR system indicates there is a strong accident interaction of the human death and property damaged with the human injury at different lags (Table 3).

As puts below tables all human injury, human death and property damaged VAR models are statistically significant and many independent variables have expected sign. When we look injury with some selected traffic accident causes pedestrians faulty variable is highly cause for human injury. The result shows us when pedestrians or road users faulty increase in the road by ten persons, they cause for 69 persons to be injured by traffic accident, other things remain constant.

Similar to pedestrian faulty variable drug has also positively and high relationship to human injury by traffic accident. The result is statistically significant and it shows us when ten drug users driver increase in the driving, they cause for 19 persons to be injured by traffic accident, other things remain constant.

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The coefficient of technique faulty is also positively, high relationship to human death by traffic accident and statistically significant at 1%. The result reveals us when one hundred car with technical problem increase in the area, they cause for 698 persons to be injured by traffic accident, other things remain constant.

The coefficient of other faulty is also positively, high relationship to human death by traffic accident and statistically significant at 5%. The result reveals us when one hundred different problems other than listed here are created in the road, they cause for 167 persons to be injured by traffic accident, others things remain constant.

Similar to listed above variables the coefficient of violating any rule has also positive and statistically significant at 5%.The VAR result shows us when ten different violating rule driver are increase in driving area, they cause for nine persons to be injured by traffic accident, other things remain constant.

The coefficient of wrong pass is also positively, high relationship to human death by traffic accident and statistically significant at 5%. The result reveals us when one hundred drivers have the attitude to pass first in the road, they cause for thirty three persons to be injured by traffic accident, others things remain constant.

The coefficient of speed is also positively, high relationship to human death by traffic accident and statistically significant at 5%. The result reveals us when one hundred drivers have high speed in the area, they cause for twelve persons to be injured by traffic accident, other things remain constant.

The last and the least effect coefficient is population density which have also positively, slightly relationship to human death by traffic accident and statistically significant at 1%. The result reveals us when one hundred peoples are increases in the city, they cause for one person to be injured by traffic accident, others things remain constant.

Table 3. Regression Results and Analysis for human injury

VAR00002	Coef.	Std. Err.	z	P>z
VAR00002				
VAR00002				
L1.	-0.72817	0.248972	-2.92	0.003
L2.	-1.86879	0.650544	-2.87	0.004
L3.	-1.30876	0.281567	-4.65	0
L4.	-0.8633	0.937682	-0.92	0.357
L5.	0.129389	0.347659	0.37	0.71
population	0.011179	0.000263	4.49	0
Drug (alcohols and chat) user drivers	1.912098	0.426996	2.6	0.009
Any technical problem of the car	6.980115	2.389281	2.75	0.006
Violating any rule	0.900419	0.484434	2.45	0.048
Wrong pass	0.328986	0.040774	0.71	0.077
Over speed	0.121099	0.019173	2.1	0.071
Other cause	1.671243	0.630656	2.54	0.024
Pedestrian faulty	6.873501	2.060448	3.09	0.002
Road faulty	10.96511	69.47935	0.15	0.877
_constant	-1510.05	258.2549	-4.72	0

As puts below table property damaged VAR models are statistically significant and many independent variables have expected sign. When we look property damaged with some selected traffic accident causes drug variable is highly cause for property damaged. The result shows us when drug users driver increase in the area by one person, he/she cause for 981,042 birr capital damaged by traffic accident, other things remain constant.

The coefficient of technique faulty is also positively, high relationship to property damaged by traffic accident and statistically significant at 1%. The result reveals us when one car with technical problem increases in the area, they cause for 614,440 birr capital damaged by traffic accident, others things remain constant.

Similar to listed above variables the coefficient of violating any rule has also positive and statistically significant at 5%.The VAR result shows us when one different violating rule driver are increase in driving area, they cause for 96,106 birr capital damaged by traffic accident, other things remain constant.

The coefficient of population is also positively, slightly relationship to property damaged by traffic accident and statistically significant at 5%. The result reveals us when one person increases in the Addis Ababa city road, he/she cause for

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50 birr capital damaged by traffic accident, others things remain constant.

Table 4. Regression Results and Analysis for Property damage

VAR00004	Coef.	Std. Err.	z	P>z
VAR00004				
VAR00004				
L1.	-0.58569	0.760131	-0.77	0.441
L2.	3.4828	0.803833	4.33	0
L3.	0.344518	1.044073	0.33	0.741
L4.	-1.53114	1.296004	-1.18	0.237
L5.	-3.95748	1.356871	-2.92	0.004
population	50.8743	37.22976	2.37	0.072
Drug (alcohols and chat) user drivers	981041.9	369345.3	2.66	0.008
Any technical problem of the car	614440.2	190848.3	3.22	0.001
Violating any rule	96105.95	62251.32	2.54	0.023
Wrong pass	538.7383	5132.032	0.1	0.916
Over speed	-371.167	2064.317	-0.18	0.857
Other cause	-246714	72413.48	-3.41	0.001
Pedestrian faulty	-370690	142760.8	-2.6	0.009
Road faulty	2601103	4367284	0.6	0.551
_constant	-8.61E+07	7.63E+07	-1.13	0.26

5.5 Prediction

The prediction of VAR model implies us in 2023 G.C Addis Ababa City annually loses property by road traffic accident will causes about 900 million birr. Even the collect data and results show the nominal result, the accident is accelerated than the city growth. Due to some data defects the model can't forecast human injury and human death.

5.1. Conclusion and Recommendation

5.1. Conclusion

Road traffic accident resulted fatalities and injuries continue to be a significant for morbidity and mortality problem in Addis Ababa requiring urgent attention and containment as has been done in some countries with developed economies. The problem of road traffic accidents' in Addis Ababa though must not be seen and managed through the lens of road traffic accidents' being just a safety issue", and hence being tackled as such; as has been reflected in the public field in the past.

What this paper particularly stresses and brings to the Addis Ababa RTA discussion, is that the problem of RTA containment should primarily focus on prevention by utilizing a maximum awareness and made road safety. This approach draws on all the relevant road traffic operation and management, statistics, environmental sciences, behavioral sciences, safety and injury prevention, road traffic enforcement and others, as well as the incorporation of emergency and advanced pain support services, to guide and formulate policies towards containing the scourge of the RTA problem currently confronting the country.

This document is concern that the problem of road traffic accident's in Addis Ababa is not typical of Addis Ababa only, but a problem in all Regional State of Ethiopia and Sub-Saharan Africa in general. Hence the socio-economic problem implications and solutions discussed below apply as much to Addis Ababa, as well as other Regional states in Ethiopia. The urgency for containment of the road traffic accident situation in Addis Ababa (and the other Regional states) is especially important now; more so as the United Nations agencies like world health organization considers the problem of road traffic accident containment a global public health priority, and has declared the decade 2011 to 2020 as the "decade of action for road safety".

5.2. Policy Implication (Recommendation)

Looking at the state of road accidents and the number of people who are killed via road accidents in Addis Ababa, it is recommended that;

1. Education

Continuously taking awareness for passenger and driver has a diamond role to decrease road traffic accident. This should be by well fruit full training drivers and supporters, capable skill to all society by different mass media and mini media that address individual.

2. Traffic safety should be insured by removing any conflict (using time segregation –signal or space segregation - over pass) between road users. (Gold role)

3. Enforcement (Gold role)

There are too many law breaker driver, supporter and people work with traffic police and car station area. There are also to many 'chat' user and drunker driver, unethical worker in these

area; so institutions that enforce road traffic regulations should do well to apply the law especially on peak hour of the day that all perpetrators of traffic offences shall be brought to book to deter others from repeating such offences.

4. Since the type of vehicle involved in the accident affects the number of people expected to be killed, drivers of vehicles such as cars and buses should be given special training to be able to avoid preventable accidents.

5. Addis Ababa road authority should increase the road quality and size in the city. The road quality and size is increase from time to time but can't be compute the high increase of population and vehicle in the city. So the authority has the vital road in decrease road traffic accident.

Area for future researcher

Road traffic science is interdisciplinary of different science by its behavior. To see the dynamics of the impact of traffic accident different expertise should analyses by different models. So the extra impacts of road traffic injure and how to implement project in the area is also opened. By reduce road traffic accident and capital accumulation is also open to farther work. In addition, studying the impact by including more variables indicators is encouraged to see on which outcome indicators the program works well and thereby inform stalk holders to work on accordingly.

Reference

Abegaz T, Berhane Y, Worku A, Assrat A, Assefa A. Road traffic deaths and injuries are under-reported in Ethiopia: a capture-recapture method.

Albert C. 2014 Road Traffic Accidents in Ghana: A Public Health Concern, and a Call for Action in Ghana, (and the Sub-Region)

Al-Saif. A, 2012. (Estimating the effect of traffic accidents in Arab Gulf Countries), Saudi Society for Traffic Safety, Dammam, Kingdom of Saudi Arabia.

Amiruddin Ismail1 and Hussin A.M Yahia, "Causes and effects of road traffic accidents in tripoli Libya", *Proceeding the 6th Civil Engineering Conference in Asia Region: Embracing the Future through Sustainability*

Boufous, S., Williamson, A., 2009. Factors affecting the severity of work related traffic crashes in drivers receiving a worker's compensation claim. Accident Analysis and Prevention 41, 467–473.

Cerelli, E. (1996). Crash Data and Rates for Age-Sex Groups of Drivers, Report to the National Highway Traffic Safety Administration, U. S. Department of Transportation.

Chitere, P.O, and Kibua, T.N. (2012) Effort to improve road safety in Kenya. Achievements and limitations of reforms in Matatu industry, Dessie, T., and Larsson, C.P. (1990). The occurrence and driver characteristics associated with motor vehicle injuries in Addis Ababa, Ethiopia; Journal of Tropical Medicine and Hygiene, 94: 395- 400.

Creswell J. W., (2009) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 3rd edition, Landon, Sega publications.

Dawson C. (2009) *Introduction to research methods*: A practical guide for any one undertaking a research project, 4th edition, United Kingdom, Books Ltd.

Dorn, L. (1992), "Individual and Group Differences in Driving Behaviour (Neuroticism, Gender, Age)", Ph. D. Thesis, Aston University, U. K.

Global status report on road safety (2013). Supporting a decade of action. Geneva, World Health Organization, 2013.

Greg Chen, 2009 Road Traffic Safety in African Countries – Status, Trend, Contributing Factors, Counter Measures and Challenges The City University of New York

Greene W. (2012) *Econometrics Analysis* Dorling Kindersley Plc. New Delhi, India.

Gujarati D.(2009) *Basic Econometrics 5th edition* Tata McGraw Hill Education Plc. New Delhi, India.

Mark E., Greg M., Jonathan D Moyer and Erin T., 2012 Putting the brakes on road traffic fatalities in Africa African future brief

Oppong, R. (2012) Statistical Analysis Of Road Accidents Fatality In Ghana Using Poisson Regression, Accra, Ghana.

Osoro A.A., Ng'ang'a Z.and Yitambe A. (2014) *An analysis of the incidence and causes of road traffic accident in Kisii, Central district, Kenya* Nairobi Kenya.

Pali Lehohla Statistician-General 2009 Road Traffic Accident Deaths in South Africa, 2001–2006: Evidence from death notification

Skuli Thordarson and Bjorn Olafsson 2008 "Weather induced road accidents, winter maintenance and user information" Transport Research Arena, Ljubljana, Europe

Roni , D. Mahalel, G. Yair, 2007. "The social accident: A theoretical model and research agenda for studying the influence of social and al characteristics on motor vehicle accidents". Accident Analysis and Prevention 39, 914-921.

Ryan, G. A., Legge, M. and Rosman, D. (1988), "Age-related changes in drivers' crash risk and crash type", in Accident Analysis and Prevention, vol. 30, no. 3, pp. 379-387.

Teferi A., Samson G.in (2018) Magnitude of road traffic accident related injuries and fatalities in Ethiopia.

Thompson, D. (1996), "Improving Teen Driving (Miracle in Crystal City)", The News and Observer, September 19, Raleigh, Carolina.

WHO(World health Organization, 2017) Global status report on road safety 2017 https://extranet.who.int/roadsafety/death-on-the-roads/#alcohol

WHO(World health Organization, 2018) Global status report on road safety 2018 https://extranet.who.int/roadsafety/death-on-the-roads/#alcohol

Yazan I.(2016) *Effect of driver's personal characteristics on traffic accidents in Tabuk city in Saudi Arabia*, ITPS, Manaus, Brazil. ISSN 2238-10 Road Safety In The Who African Region

Yannis, G., Golias, J., apadimitriou E. 2007, "Accident Risk of Foreign Drivers in Various Road Environments", Journal of Safety Research 38. 471-480, Department of Transportation, Planning and Engineering, University of Athens, Athens, Greece.

Appendix
Appendix 1: Normality Test

The following three graphs shows us test for normality of the model. All three models have no high variance with in the years. These all determines variance autoregressive is the correct decision.

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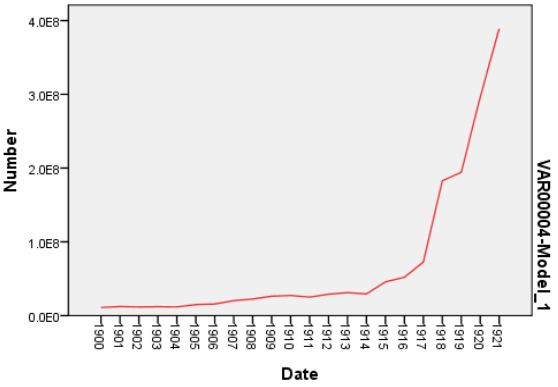

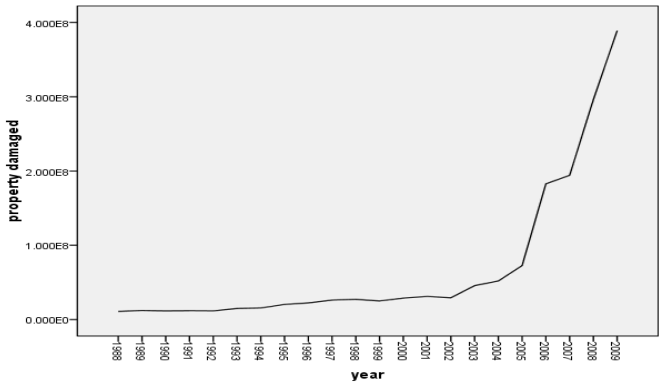

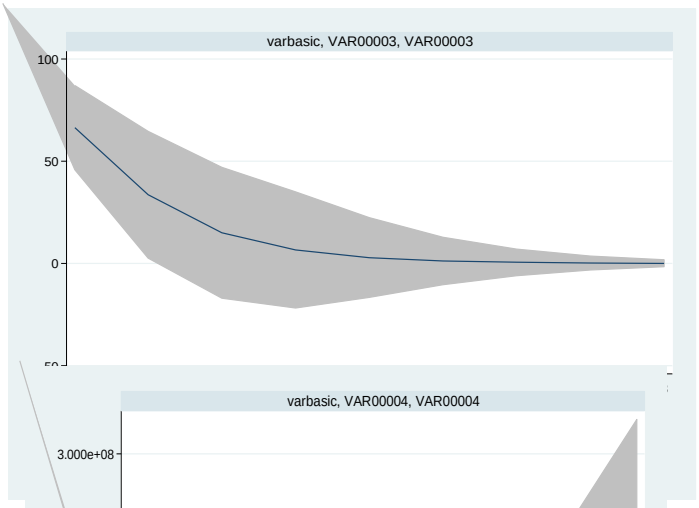

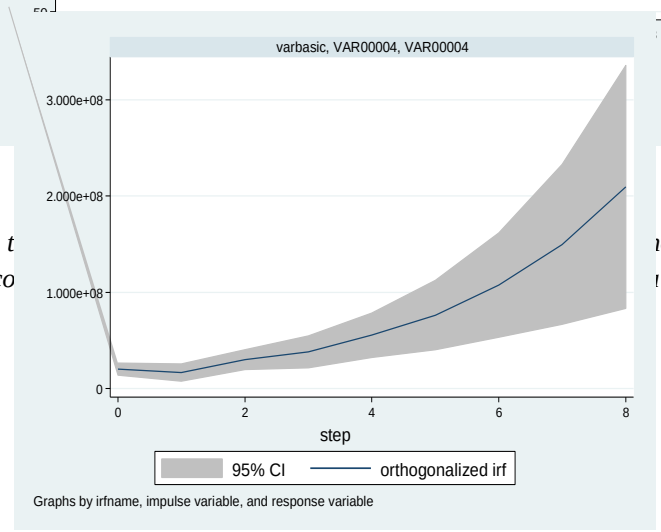

Appendix 2 : Stability Test

All of the calculated eigen-values (which can be complex) are less t *odel is stable. This condition is the vector extension to the stationarity co* *single variable lie outside the unit circle.*

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Eigen value stabilitycondition

Eigen value	Modulus
.01474118 + .7116062i	.711759
.01474118 - .7116062i	.711759
.01474118 - .7116062i	.512754
.01474118 - .7116062i	.515757
.01474118 - .7116062i	.419756

All the Eigen values lie inside the unit circle.

VAR satisfies stability condition.

Appendix 3: Granger causality result

```
. vargranger
```

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
_	ALL	29.766	12	0.003

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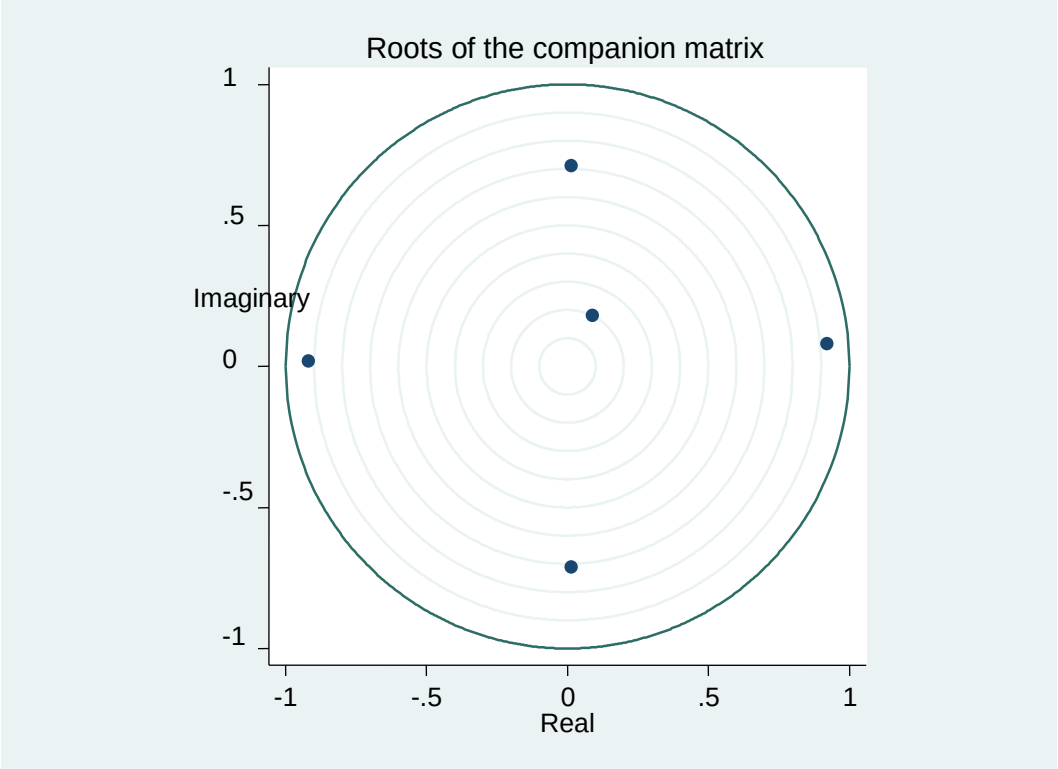
Appendix 4: Roots of the companion matrix result



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Appendix 5 Property damaged forecast result