ECONOMIC CONDITION AND ROAD TRANSPORT CRASHES IN NIGERIA: EVIDENCE FROM STATE LEVEL DATA

Ahmed TaruwereYakubu[1*]& Ismail Aremu Muhammed[2]

[1]Department of Economics, University of Ilorin, Ilorin, Nigeria.
[2]Analytiques Consult, Ilorin, Nigeria.

*Corresponding author's email: ytahmed@unilorin.edu.ng

Abstract

This study investigates the impact of economic condition proxied as unemployment on road transport crashes across states in Nigeria. Both the descriptive and inferential analyses were employed to describe the panel data employed in this study. The dynamic system Generalised Methods of Moments (GMM) was employed on the panel data collected from National Bureau of Statistics. The study found that unemployment has a positive impact on road transport crashes across states in Nigeria and unemployment increases the number of reported cases of road transport crashes in all geopolitical zones of Nigeria. We also found that causative factors of road crashes such as speed limit violation, bad roads and road obstruction violation increase road transport crashes. Further findings revealed that inflation increases road transport crashes in the South-Eastern region, decreases road transport crashes in the North-Eastern and South-Southern regions, but does not determine road transport crashes in other regions of the country. The study concluded that aside causative factors of road crashes such as speed limit violation, bad roads and road obstruction violation which has been present for decades, the menace of unemployment is also being felt in road transport crashes across states. It is therefore, recommended that state governments should look into ways of empowering individuals through entrepreneurship and other empowerment programmes in order to reduce the rate at which people wander around in search of jobs to earn a living.

Keywords: Economic Conditions, Road Crashes, GMM, Nigeria

JEL Classifications: E24,L92, R40, R41, R49

Introduction

A road traffic crashes (RTC) is a collision that occurs or begins on a public road or street, resulting in the death or injury of one or more people and the involvement of at least one moving vehicle. Vehicle-to-vehicle crashes, vehicle-to-pedestrian collisions, vehicle-to-animal collisions, and vehicle-to-fixed-obstacle crashes are all covered by RTC.Road traffic crashes are a major public health issue worldwide, particularly in low and middle-income nations. According to the World Health Organization (WHO), over 1.25 million people die each year from injuries, while up to 50 million people suffer non-fatal injuries and many become disabled as a result of them. By 2030, road traffic accidents are expected to be the sixth largest cause of mortality (WHO, 2015).While high-income countries have seen significant reductions in road traffic deaths and injuries, death tolls in low- and middle-income countries have been rising as a result of increased motorization and urbanization, which has not been accompanied by safe vehicles, infrastructure, or enforcement of road safety regulations.Despite the fact that poor and middle-income nations account for 54 percent of registered vehicles and 82 percent of the global population, they accounted for 90 percent of road traffic deaths in 2015 (Yakubu, 2015).

Since 2010, the African continent has had the highest fatality rates. The region's traffic fatality rates per 100 000 inhabitants were highest in 2010 and 2013, at 24.1 and 20.6 correspondingly (WHO, 2013; 2015). In Nigeria, the predicted rate of road traffic deaths per 100,000 people fell from 33.7 in

2010 to 20.5 in 2013.In 2016, however, the number of traffic fatalities (5,053) and injuries (30,105) was quite high (FRSC, 2017).

Road traffic deaths and injuries worsen poverty in families by causing the loss of a breadwinner and increasing the cost of treating and caring for those who have been injured or incapacitated.Road crashes stymie economic progress by removing persons between the ages of 15 and 44 (who account for 48 percent of global road deaths) from the labour, lowering productivity. According to the World Health Organization (WHO), Nigeria's gross domestic product (GDP) was lost by 3.0 percent in 2015 due to road traffic crashes. Therefore, the design and execution of national policies aiming at meeting the Sustainable Development Goal 3 target of a 50% reduction in road traffic deaths and injuries by 2020 will require a thorough understanding of the contributing variables to road traffic crashes.

In the literature, factors contributing to road crashes include unsafe vehicles and bad road infrastructure, as well as road users'attitude such as risk-taking behaviour, excessive speeding,traffic violations,failure to comply with driving rules such as wearingmotorcycle helmet and motor seat belt. It was also documented in the literature thatdriver age, skill, inexperience cause road accidents.Driving under the influence of alcohol or drugs, using a cell phone while driving, poor traffic law enforcement, and poor post-crash care are all variables that have been linked to road accidents.It is also commonly known that as the economy grows, so does vehicle ownership and travel, resulting in a rise in fatalities and injuries.

However, in spite of these investigations on the determinants of road transport crashes, the role of economic conditions such as unemployment has been largely ignored in the literature. The only exception is the study by Akinyemi (2020) which was conducted for Nigeria. In terms of how unemployment affect road transport crashes across states in Nigeria, no known study has carried out a state-level investigation into this issue. This study therefore, emerged to fill this void by investigating the impact of unemployment on road transport crashes across states in in Nigeria.

Literature review

Economic conditions and road crashes: the link

The link between economic condition and road traffic crashes can be deduced from the driving behaviour of both commercial transit service providers and private car owners. Unemployment or unemployment threat may lead to mental stress, which results in worse driving behaviour such as aggression, lack of attention, and increased risk-taking. This is capable of increasing the frequency of road traffic accidents. Economic conditions made individuals who are artisans, tailors, iron benders and tachnicians to become emergency commercial transit service providers due to irregular supply of electricity as the case may be. This untrained people who are often not licensed to drive, contribute negatively to road traffic accidents in Nigeria. In this way, individuals who lost their jobs due to the economic situation of the country, often convert their private cars to commercial vehicles to make ends meet. This set of people often cause road accidents in an attempt to make money within a short period because the chance of disebeying traffic rules by this people is high.

Empirical literature

Few studies have empirically investigated the link between economic conditions and road crashes in developed economies. For instance, Wijnen and Rietveld (2015) found that the majority of studies on individual countries were from the United States, European countries, Australia, Canada, China, and New Zealand, according to a review of studies on the relationship between economic development and the number of road casualties (fatalities and/or injuries) and crash risk.The studies looked at used time-series analysis, panel studies, and cross-section analysis, and the data was from 1947 to 2008. GDP per capita, or disposable income per capita, and unemployment rate, or the number of unemployed people, were the most commonly utilized indices of economic development in the studies. The number of fatalities or fatal crashes was employed as a dependent variable in this study.

First, relatively earlier studies based on data from more developed countries such as for Japan (Granados, 2008), the United States (Ruhm, 2000), OECD countries (Elvik, 2014), New Zealand (Schuffham, 2003) andGermany (Neumayer, 2004), indicated that fatality rises when unemployment

falls and falls when economic growth rises. For relatively recent studies, over the period 1985-2009, Al-Reesi et al. (2013) examined the trend of road traffic injuries in Oman in connection to motorization rates and economic growth. The findings imply that increased motorization is linked to an increase in traffic deaths.Kweon (2015) looked at the decline in traffic fatalities in the United States from 2008 to 2012 and discovered that annual variations in the unemployment rate and the consumer price index were substantially connected with annual changes in the number of crashes and deaths.

To study the Kuznet curve link between non-fatal road injuries and per capita income, Law (2015) used a fixed effect negative binomial regression analysis on panel data from 90 countries from 1963 to 2009.The findings revealed an inverted U-shaped connection in which the frequency of road deaths increased as per capita income climbed at lower income levels but decreased once it exceeded a threshold level.For the period 2004-2011, He *et al.* (2015) employed a multivariate fixed effect model to investigate the association between gross regional product (GRP), road traffic fatalities (RTF), and crash fatality ratio (CFR) in Russia. In the 66 regions, RTF and CFR declined in lockstep as GRP per capita increased.He (2016) used state-level panel data from 2003 to 2013 to examine the association between unemployment and the rate of motor vehicle fatalities in the United States. According to regression analysis, each percentage point rise in the unemployment rate resulted in a statistically significant 2.9 percent decrease in mortality rates.Antoniou *et al.* (2016) analysed the time series of the number of fatalities and GDP in 30 European nations from 1975 to 2012 using the Common Correlation Effects Mean Group Estimator (Pesaran) approach. For ten countries, the long-term elasticity mean value was 0.63, which was significantly different from zero.

By applying the cointegration technique and a vector error correction model to investigate the short and long-term relationship between the frequency of traffic accidents, fuel consumption, and GDP per capita in Algeria over the period between 1970 and 2013, Bougueroua and Carnis (2016) revealed that GDP per capita has a positive short- and long-term impact on the number of traffic accidents.The association between economic development and road traffic collisions, fatalities, and injuries in Nigeria was investigated by Akinyemi (2020). The ARDL methodology to cointegration was used to estimate the short- and long-run effects of economic development on road safety using data collected over a 26-year period (1991-2016).The findings revealed that, over time, both collisions and fatalities drop while injuries increase as GDP rises. In the near run, GDP reduces mortality, but the detrimental impact of GDP on injuries takes three years to appear. In the long run, GDP has a substantial impact on collisions, fatalities, and injuries. However, GDP only had a short-term impact on mortality and injuries.

From the reviewed studies, this study pinpointed that most of them were conducted more developed countries and not Nigeria, with the exception of Akinyemi (2020) which was conducted using aggregated data for Nigeria as a whole. it was also seen that the studies were conducted on aggregated road transport crashes for each country (including the study by Akinyemi (2020)), as such the studies were conducted for the countries as a whole. The only study that was conducted on state-level was that of He (2016) which was conducted for the United States. More so, the dynamic GMM method has been widely ignored in the literature on road transport crashes and hence, the importance of this method in controlling for the likely endogeneity of included explanatory variables. The present study is therefore conducted to fill these void in the literature by examining the impact of unemployment on road transport crashes across states in Nigeria, employing a dynamic system generalized method of moments (GMM) estimator.

Methodology

Model specification

This study specifies its empirical model here by adapting the model of Akinyemi (2020) to include inflation rate and exclude GDP due to insufficient historical data for GDP across all states.The model of this study is therefore specified as follows.

$$lnRTC_{it} = \varphi_0 + \varphi_1 lnRTC_{it-1} + \varphi_2 CFI_{it} + \varphi_3 UNE_{it} + \varphi_4 INF + \epsilon_{it}$$

where: $lnRTC$ is log of road transport crashes; CFI is causative factor index; UNE is economic condition proxied as unemployment; INF is inflation. The included first period lag of the log of road transport crashes is due to the influence of past level of road transport crashes on current levels and a reflection of the dynamism in the model.

Estimation technique

The methods used to estimate the influence of unemployment on road traffic crashes are detailed in this section. The dynamic panel system generalized method of moments (GMM) estimator, which takes into account the lagged dependent variable as an explanatory variable, was used to estimate the regression model described in the equation.The Arellano-Bover (1995)/Blundell-Bond (1998) estimators have been widely used in empirical research and were designed for situations involving a large panel of individuals with short time periods, a linear functional relationship, non-strictly exogenous explanatory variables, fixed individual effects, and autocorrelation and heteroscedasticity within the panel but not between them (Roodman, 2008).

Data Sources and measurement of variables

The focus of this study is mainly on the impact of unemployment on road transport crashesacross states in Nigeria. Theentire states in Nigeria are 36 in numbers plus the Federal Capital Territory (FCT) making 37. This study includes all 37 in the sample.The investigation covers an annual datafor the period of 2017–2020.The data for road transport crashes, causative factor index, unemployment and inflation across the states in Nigeria were sourced from National Bureau of Statistics (NBS). Table 1 shows an overview of the data source and measurement, as well as an outline of the explanatory variables used, their respective measurement, and sources.

Table 1: Measurement and Sources of Variables

Variable	Measurement	Source
Road Transport Crashes (lnRTC)	Natural log of the number of reported cases of road transport crashes across states in Nigeria.	National Bureau of Statistics (NBS)
Causative Factor	Index of causative factors of road transport accident such as bad roads, speed limit violation etc.	National Bureau of Statistics (NBS)
Unemployment	Annual percentage of unemployed individuals to total labour force.	National Bureau of Statistics (NBS)
Inflation	Annual growth of consumer price index.	National Bureau of Statistics (NBS)

Source: Authors' Compilation.

Results and Discussion

Preliminary

In the preliminary results, Table 1 shows a description of the variables in form of mean, standard deviation, minimum and maximum values. It shows that road transport crashes averaged 177.4 cases across states in Nigeria over the period under investigation. With a spread of 173.5 crashes around this average, as low as seven crashes was witnessed by a state in a particular year and a many as 1,181 crashes was witnessed by a state in a year. Causative factor index averaged 188.97 points with a spread of 185.82 points around this average. A state witnessed as low as eight causative factor points in a year while a state witnessed as high as 1,269 causative factor points during a year. Unemployment across these states averaged 15.77 percent and has a spread of 10.98 percent around this average. As low as 0.12 percent unemployment was witnessed by a state in a given year and as high as 36.51 percent unemployment was witnessed by a state during a year. Inflation rate has an average of 13.03 percent across states during the period under investigation. This has a spread of 10.98 percent around this mean, with as low as 8.21 percent being witnessed as inflation rate by a state during a year and as high as 21.92 percent of inflation being witnessed by a state during a year.

Table 1: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Road Transport Crashes	177.40	172.49	7	1181
Causative Factor Index	188.97	185.82	8	1269
Unemployment	15.77	10.98	0.12	36.51
Inflation	13.03	2.12	8.21	21.92

Source: Authors' Computations, 2021.

To further describe the variables of this study, a pairwise correlation analysis was conducted. This is to examine the linear relationship that exist among variables. The result indicates that roan transport crashes have significant positive relationship with causative factor index and has a significant negative relationship with inflation rate but has no significant relationship with unemployment. The result implies that road transport crashes moves in the same direction with causative factors as higher levels of causative factors are associated with higher levels of road transport crashes and vice versa. The result also indicates that road transport crashes moves in opposite direction with inflation rate, as higher inflation rates are associated with lower road transport crashes and vice versa.

It was also shown in the result that index of causative factors of road transport crashes have significant negative relationship with inflation rate, suggesting that both variables move in opposite direction and that higher levels of one of them are associated with lower levels of the other, and vice versa. Causative factor index is seen to have an insignificant relationship with unemployment. Likewise, the result shows that unemployment and inflation have no significant relationship between them.

Table 2: Correlation Matrix

Variable	Crashes	Causative Index	Unemployment	Inflation
Crashes	1			
Causative Index	0.098*	1		
Unemployment	0.153	0.082	1	
Inflation	-0.232*	-0.215*	0.002	1

Source: Authors' Computations, 2021.*Note: * indicates significant relationship at 5% significance level*

Main analysis

In order to present the main analysis of this study, which is to examine the impact of unemployment on road transport crashes across states in Nigeria, a preliminary test was conducted to understand the property of the data employed in this study. This is the cross-sectional dependence test. Both the Pesaran' (2004) and Friedman's (1937) procedures were employed to check for cross-sectional dependence in the dataset. The result shows that there is no presence of cross-sectional dependence in the model since the generated statistic value of -0.929 under the Pesaran procedure has a p-value of 0.352 and the generated statistic value of 1.249 has a p-value of 1.000 under the Friedman test procedure. Given that the null hypothesis in these tests states that 'there is no presence of cress-sectional dependence in the panel units', the results indicate that there is insufficient evidence to reject the test's null hypothesis under both test procedures. Hence, the model is free from cross-sectional dependence problem.

Table 3: Cross-Sectional Dependence Test Results

	Pesaran (2004)		Friedman (1937)	
Model	Statistic	p-value	statistic	p-value
Road Transport Crashes	-0.929	0.352	1.249	1.000

Source: Authors' Computation, 2021.

The panel GMM regression result presented in Table 4 shows that the first period lag of road transport crashes has a significant negative coefficient of 0.232, which is significant at 1% significance level (with p-value of 0.000). This indicates that road crashes in the succeeding periods are higher than

those of previous periods. This might be an indication that, even though road transport crashes are still high across states in Nigeria, measures being taken to reduce them are not materialising as the number of crashes continues to increase.

The result also shows that causative factor index has a significant positive impact on road transport crashes, as its coefficient of 0.001 has a p-value of 0.001, which indicates that it is significant at 1% significance level. This implies that the presence of causative factors of road crashes such as speed limit violation, bad roads and road obstruction violation will lead to higher road transport crashes by 0.1percent per year. Unemployment rate is seen to have a significant positive impact on road transport crashes across states in Nigeria, with its coefficient value of 0.028 which has a p-value of 0.000. Its coefficient indicates that a point increase in unemployment across states will lead to an increase in road transport crashes across states in Nigeria by 2.8 percent annually. This may imply that increase in unemployment might increase the rate at which individuals move around within and across states in search of livelihood, thereby increasing the level of road transport usage and consequently increase road transport crashes.

Inflation rate is seen to have an insignificant impact on road transport crashes across states in Nigeria. This could be verified by its coefficient of -0.027 which has a p-value of 0.539, indicating that it is not statistically significant.

Table 4: System GMM Result

DV=lnRTC	Coefficient	Z	p-value
lnRTC(-1)	0.232***	4.49	0.000
Causative Factor Index	0.001***	3.19	0.001
Unemployment	0.028***	6.63	0.000
Inflation	-0.027	-0.61	0.539
Constant	3.520***	7.28	0.000
Groups	37		
Wald Chi-squared	281.06***		0.000
Arellano-Bond Autocorrelation test (2)	-0.9917		0.321
Sargan test of over-identifying restrictions	2.4724		0.414

Source: Authors' Computation, 2021.*Note: * indicates significant at 5%; ** indicates significant at 10%; and *** indicates significant at 1%.*

The result diagnostics shows that the reported Wald chi-squared value of 281.06 and its p-value of 0.000 indicates that the overall model is statistically significant and in good fit. Arellano-Bond autocorrelation test value of -0.9917 and its p-value of 0.321 indicate that the test's statistic is not significant and the test's null hypothesis which states that there is no autocorrelation is not rejected and hence, the model is free from autocorrelation problem. Sargan test of over-identifying restriction has a statistic value of 2.4724 and p-value of 0.414, suggesting that the test's null hypothesis, which states that over-identifying restrictions are valid, could not be rejected. Therefore, over-identifying restrictions imposed on the instruments used in the model are valid.With the overall result pointing towards the important role of unemployment in causing increased road transport crashes across all states in Nigeria, it is also pertinent to this study to conduct this analysis across states in each geopolitical zone.

The results presented in Table 5 shows that for all geopolitical zones except South-Eastern, road transport crashes in recent periods are greater than they were in previous periods. This is expected as the level of road transport crashes in these regionsare higher in recent periods. This is suggestive of increase in crashes in these regions over time.As for South-Eastern geopolitical zone, road transport crashes in recent periods are lower than they were in previous periods, suggesting that there has been a decline in crashes over time in this zone.Causative factor and unemployment remained significant and positively affecting crashes in all geopolitical zones except in the North-Eastern zone where causative factor became insignificant. Inflation is only significant in affecting road transport crashes in three regions – the North-Eastern, South-Southern and South-Eastern regions. While inflation had

negative impact on road transport crashes in North-Eastern and South-Southern, suggesting that increase in inflation reduces the occurrence of road transport crashes in these two regions, inflation had a positive impact on road transport crashes in the South-Eastern region which suggests that increase in inflation increases the occurrence of road transport crashes in the region.

Discussion

The main aim of this study was to examine the impact of economic condition proxied by unemployment on road transport crashes across states in Nigeria. In other words, the study sought to investigate if the level of unemployment in each state has been influential leading to increased usage of public roads in the search for daily livelihoods and consequently increased road transport crashes. The study found that unemployment is influential in leading to increased road transport crashes across states. It was very obvious in all geopolitical zones of the country as the level of unemployment strongly increased road transport crashes among the states of each of these regions. The implication of this finding is that continuous increase in the level of unemployment does not only cause a fall in livelihood of individuals but also increases road calamities and further increase the socio-economic worries of individuals. This findings conforms to submission of Akinyemi (2020),and Kweon (2015) that economic development, particularly, movements in unemployment determine the level of road transport accidents.

Table 5: System GMM Result (Geopolitical Zones)

	North West		North East		North Central		South West		South South		South East	
DV=lnRTC	Coefficient	Z	Coefficient	Z	Coefficient	Z	Coefficient	z	Coefficient	z	Coefficient	z
lnRTC(-1)	0.08	1.44	0.25***	5.56	0.24***	4.64	0.11	1.19	0.21**	2.53	-0.14**	-2.45
Causative Factor	0.001**	2.46	0.001	1.58	0.001***	5.45	0.001***	2.64	0.01***	4.07	0.01***	11.38
Unemployment	0.02***	4.59	0.04***	5.05	0.02***	5.60	0.02*	1.70	0.02***	4.76	0.01**	2.11
Inflation	0.07	0.81	-0.08**	-2.03	0.01	0.27	-0.02	-1.12	-0.24***	-3.42	0.06**	2.44
Constant	3.21***	3.47	3.87***	6.93	3.57***	12.62	4.30***	7.80	5.29***	5.94	3.17***	6.69
Groups	7		6		7		6		6		5	
Wald	86.51***		793.16***		585.22***		272.27***		79.39***		24375.6***	
AR(2) test	-1.15		-1.52		0.56		0.92		-0.06		-0.91	
Sargan test	5.42		4.83		6.58		3.97		3.72		6.33	

Source: Authors' Computation, 2021.*Note: * indicates significant at 5%; ** indicates significant at 10%; and *** indicates significant at 1%.*

Conclusion

The findings of this study suggest that unemployment affect road transport crashes positively and this positive impact is highly pronounced for the states in all geopolitical zones. This study therefore, concludes that the high rate of unemployment across the states of the country is also responsible for the increased road transport crashes, mostly through the rise in the number of individuals who set out every day in search of their daily livelihoods, which consequently increase the use of public roads and accidents. It is therefore recommended that state governments should look into ways of empowering individuals through entrepreneurship and other empowerment programmes in order to reduce the rate at which people move around in search of jobs to earn a living.

References

Akinyemi, Y. (2020). Relationship between economic development and road traffic crashes and casualties: empirical evidence from Nigeria. *Transportation Research Procedia 48*, 218–232.

AlReesi, H, Ganguly, S., Aldawi, S., & Laflamme, L. (2013). Economic growth, motorisation and road traffic injuries in the Sultanate of Oman, *Traffic Injury Prevention,* 14(3), 322-328.

Antoniou, C., Yannis, G., Papadimitriou, E.,&Lassare, S. (2016). Relating traffic fatalities to GDP in Europe on the long term. *Accident Analysis & Prevention, 92*, 89-96.

Arellano, M., &Bover, O. (1995). Another look at the instrumental variables estimation of error-components models. *Journal of Econometrics, 68*, 29–51.

Arosanyin, G. T., Olowosulu, A. T., & Oyeyemi, G.M. (2013). An examination of some safety issues among commercial motorcyclists in Nigeria: A case study. *International Journal of Injury Control and Safety Promotion, 2*0(1), 103-113.

Blundell, R., &Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics, 87*, 11–143.

Bougueroua, M., &Carnis, L.(2016). Economic development, mobility and traffic accidents in Algeria.*Accident Analysis & Prevention, 92*, 168-174.

Elvik, R.(2014). An analysis of the relationship between economic performance and the development of road safety. *International Transport Forum, OECD,* 43–142.

Federal Road Safety Corps (2017). *2016 Annual Report*. Abuja: FRSC.

Friedman, M. (1937). The use of ranks to avoid the assumption of normality implicit in the analysis of variance. *Journal of the American Statistical Association 32*, 675–701.

Granados, J.A. T. (2008). Macroeconomic fluctuations and mortality in postwar Japan. *Demography, 45*(2), 323–343.

He, H., Paichadze, N., Hyder, A. A.,&Bishai, D.(2015). Economic development and road traffic fatalities in Russia: Analysis of federal regions 2004–2011. *Injury Epidemiology, 2*(1), 19-35.

He, M. M.(2016). Driving through the Great Recession: Why does motor vehicle fatality decrease when the economy slows down? *Social Science and Medicine, 155*, 1–11.

Kweon, Y. J.(2015). What affects annual changes in traffic safety? A macroscopic perspective in Virginia. *Journal of Safety Research, 53*, 17-21.

Law, T. H. (2015). Factors associated with the relationship between non-fatal road injuries and economic growth.*Transport Policy, 42*, 166- 172.

Neumayer, E.(2004). Recessions lower (some) mortality rates: Evidence from Germany.*Social Science and Medicine, 58*, 1037-1047.

Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels. University of Cambridge, Faculty of Economics, Cambridge Working Papers in Economics No. 0435.

Roodman, D. (2008). How to do xtabond2: An introduction to "Difference" and "System" GMM in Stata. Working Paper Number 103.

Ruhm, C.(2000). Are recessions good for your health? *The Quarterly Journal of Economics, 115*, 617- 650.

Scuffham, P. A. (2003). Economic factors and traffic crashes in New Zealand. *Applied Economics, 35*, 179–188.

Wijnen, W., & Rietveld, P.(2015). The impact of economic development on road safety: a literature review. In: Why Does Road Safety Improve When Economic Times are Hard? ITF/IRTAD, Paris, 22–42.

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

World Health Organization (2015). *Global status report on road safety 2015.*

Yakubu, A.T.; Kilishi, A.A.; Mobolaji, H.I; & M.A.Yaru (2014). Institutions and road traffic offences in Nigeria: A Game theoretic approach. *The Nigerian Journal of Economic and Social Studies, 56(1),* 21-36.

Yakubu, A.T. (2015): Determinants of passenger capacity compliance among commercial motorcyclists in Kwara State Nigeria. *The Nigerian Journal of Economic and Social Studies,* 57(1), 171-181