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EFFECT OF ROAD TRAFFIC CRASHES ON LABOUR FORCE PARTICIPATION RATE IN NIGERIA

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Abstract

This study examined the effect of road traffic crashes on labour force participation rate in Nigeria during 1988 to 2023 was set out with the main objectives of establishing and determining how the Rate of Road Traffic Crashes and Road Traffic Crash fatality affected labour force in Nigeria as well as analyzing and examining the extent to which Road Traffic Crash rate of injuries and Road Traffic Crash damage to vehicles has affected economic growth in Nigeria. To achieve the objective of the study a quantitative research design predicated on Ex-Post Factor research design was adopted by this study. This is with the aim of establishing the statistical association between labour force participation rate (LFPR) and the independent variables of Road Traffic Crash Rate, Road Traffic Crash Fatality Rate, Road Traffic Crash Rate of Injuries and Road Traffic Crash Vehicle Damage Rate. Time series crash data covering thirty five years period from 1988 to 2023 sourced from the Federal Road Safety Corps Nigeria which is the lead agency in Road Safety Administration and Management. Also, the data on labour force participation rate for the period 1988 to 2022 was sourced from the international labour organisation (ILO) database. The dynamic ordinary least square (DOLS) model was utilized in this study. Trend analysis and Descriptive analysis techniques were utilized. The pre-estimation tests of Augmented Dickey-Fuller (ADF) and co-integration tests were carried out in addition to the post-estimation tests like Causality, and Cumulative Sum of Recursive Residual (CUSUM) tests. The result of the study revealed that there is a negative relationship between LFPR and RTCC, RTCFR and RTCVD. The result of unit root test confirmed co-integration of the variables This implied that an increase in the variables, that is, RTCC, RTCFR and RTCVD will result to a corresponding decrease in the LFPR. This requires urgent preventive measures in preventing any increase in the independent variables so as to stop a decrease in the dependent variable (LFPR).

Keywords: Road Traffick, Labour Force, Participation Rate, Nigeria

1. Introduction

Road transportation is a vital component of modern society, offering numerous benefits to individuals, states, and nations by facilitating the movement of people and goods to markets, workplaces, schools, hospitals, and other essential destinations, thereby generating employment opportunities. However, this benefit is overshadowed by the alarming rise in road traffic crashes (RTCs), resulting in devastating consequences, including loss of life and debilitating injuries (Pietak & Lukaz, 2014). This trend is a pressing global concern, particularly in Africa, where the escalating number of RTCs has far-reaching negative impacts on the social and economic fabric of affected countries, underscoring the need for urgent attention from policymakers and implementers alike.

Road Traffic Crash is the leading causes of deaths globally, coming behind cancer, tuberculosis

and other terminal illnesses (FRSC, 2022). The African technical review on road traffic crashes conducted in 1984 indicated that Nigeria led 37 other countries of the world in Road Traffic Crashes and Fatality rates per 10,000 vehicles – (Oyeyemi, 2022). Nigeria was number one a head of Ethiopia and Malawi which ranked 2nd and 3rd respectively while the country with the least road traffic crashes and Fatality rate per 10,000 vehicles was the USA which was ranked number 38. Oyeyemi (2022) rightly observed that Road Traffic death in Nigeria were so high that comparatively, it was 6 times than that of the Great Britain and 27 times than that of the USA. In spite of the various interventions to stem the disturbing trend in road traffic crashes by many countries including Nigeria, the WHO (2004) report on traffic injury prevention rang alarming bell on the dangerous trend of road traffic injuries as health challenge in the

21st century. In this report, the WHO change the order of daily ranking for the 10 leading causes of global burden of disease which ranked road traffic crashes as world's 9th most important health problem in its 1990 report to number three (Oyeyemi, 2022).

Available statistics from the Federal Road Safety Corps (FRSC, 2022), the lead agency in road traffic management and administration revealed that road traffic crashes in Nigeria has been increasing year-in-year-out prior-to the establishment of the agency from 14,130 in 1960 to 40,881 in 1976 in spite of the establishment of the National Road Safety Commission (NRSC) by the Federal Government in 1976. This trend led to the establishment of the Oyo Road Safety Corps (ORSC) in 1977. According to Yakassai (2019) the concern for the high rate of road accidents forced the Nobel Laureate, Professor Wole Soyinka to set up a small team to look into the issue in 1987. It was this disturbing trend that made the military regime under the leadership of General Ibrahim Badamasi Babangida to establish the Federal Road Safety Commission in 1988. Although a lot had changed since then, due to the efforts of the FRSC of putting various preventive measures to reduce the occurrences, the perception about road traffic crashes does not change much (Yakassai, 2019). For example, as a result of various interventions particularly the establishment of the FRSC in 1988, the road traffic crashes figures dropped from 28,215 in 1987 to 9,062 in 2005. However, the number began to rise again from 10,854 in 2009 to 13,583 in 2013 and 13,656 in 2022 (FRSC, 2022).

The productive labour force plays a vital role in the socio-economic development of a society. The quality of labour or entrepreneurial performance significantly influences capital growth, innovation, and the development of new products and techniques (Acemoglu & Robinson, 2012). Differences in growth rates between countries and periods can be largely attributed to the quality of the labour force or entrepreneurship (Becker et al., 2018).

The economic impact of productivity losses due to road traffic crashes (RTCs) is substantial. While it is challenging to estimate the economic cost of damage caused by RTCs, such as damage to markets, houses, or electricity poles, it is clear that these incidents can have far-reaching consequences, including disruptions to industries and services that rely on electricity (WHO, 2018). The economic costs of RTCs also include the partial or total loss of

vehicles involved, repair costs, and replacement costs (NHTSA, 2020). The socio-economic cost of road traffic injuries is enormous. Apart from cutting short the life of many people, it also results in injuries with attendant medical costs in addition to loss of properties. While it is impossible to get exact value to each case of human life lost to road traffic crashes, the global socio-economic cost is estimated to be about 1% of GNP in low-income countries, 1.5% in middle income countries and 2% in high income countries. The global cost is estimated to be \$518 billion per year with low-income and middle-income countries accounting for \$65 billion (Oyeyemi, 2022). This is by far more than the annual budget of some countries. This problem will no doubt have a serious effect on the level and rate of economic growth of the low-income and middle-income countries like Nigeria. If the estimated cost of \$518 billion United States dollar lost to RTC annually were to be avoided, the value could probably reduce world poverty by more than a half. For Africa alone, the amount could reduce poverty of the population by more than 1/3 (Idowu, 2006).

Efforts at road safety aimed at curbing the rate of road traffic crashes has been made by Nigeria and many countries of the world with a view to minimizing it to the barest minimum. The aim of these efforts is to control the effects the road traffic crashes is likely to have on the socio-economic life of the countries. Efforts at curbing road traffic crashes in Nigeria stated in 1972 by the Nigerian military on saving the lives of its officers and men from road traffic crashes through proper coordination of a road safety week and safe driving culture. This was followed by the establishment of National Road Safety Commission (NRSC) in 1974, establishment of Oyo State Road Safety Corps in 1977 and the establishment of the Federal Road Safety Commission (FRSC) in February, 1988. These efforts were to address government's concern on the cost of road traffic crashes which were a huge demand on national resources that are severally strained.

The FRSC as the lead agency in road safety management in Nigeria has also developed a lot of strategies to change the tide of RTCs in the country. The agency coordinated activities that culminated in the country to have a national blue print known as the Nigerian Road Safety Strategy (NRSS I and II) covering the periods (2011-2018) and (2021-2030) respectively. These documents were approved by the

Federal Executive Council (FEC) and the National Economic Council (NEC) as a guide to road safety activities in Nigeria. It is based on the above that this study tend to examine the effect of road traffic crashes on the labour force in Nigeria with a view to recommending other strategies that will help the country achieve its aim of road traffic crashes reduction.

Despite these efforts, road traffic crashes and its attendant effects on the economy still persist in the country. The FRSC which has been adjudge as the lead agency model for other countries in Africa by the World Bank has been doing its best to curtail the rate of road traffic crashes in Nigeria and its effects on the socio-economic life of the people through provision public education and enlightenment, prompt rescue services and/or attention to victims of road traffic crashes, enforcement of road traffic rules and regulations, etc. However, the country still faces a lot of challenges in the management and control of road traffic crashes. The road traffic crashes figures in Nigeria rose from 11,385 in 2010 to 13,196 in 2011 (FRSC, 2022). In order to address the issues associated with RTCs, the World Health Organization (WHO) under the auspices of the United Nations (UN) launched the UN decade of action for road safety in 2011 with a call on governments to develop strategies and increase funding and advocacy for actions that will deliver a reduction of the current global road traffic causality situation by 50% by the year 2020 (Mahama, 2015).

2. Literature Review

2.1 Conceptual Review

The Federal Road Safety Commission (2016) viewed road as a path established over land for the passage of vehicles, people and animals. It provides dependable pathway for moving people and goods from one place to another. It also broadly classified roads into three, namely: single carriageway, dual/multiple carriageways and expressways. The long man dictionary viewed road traffic as the movement of vehicles along a road or street, the movement of aircraft, ships, or trains from one place to another, the movement of people or goods by aircraft, trains, ships and the secret buying and selling of illegal goods. It thus means the movement of vehicles, persons, ships, aircraft, etc. in an area along a street, through an air lane, over a water route, etc. Road traffic can therefore be defined to mean the

movement of vehicle or people along the road. It is the movement of vehicles and pedestrians along any section of a public road network.

A road traffic crash otherwise known as accident can be defined as an accident or collision involving at least one vehicle on a road open to public traffic. Road traffic crash (RTC) or accident is conceived differently by different persons and organizations. Hollnagel (2004) conceive accident to be a short, sudden, and unexpected event or occurrence that results in an unwanted and undesirable outcome. Along these lines, the accident is not in reality expected and can cause negative outcomes, for example, fatalities, wounds, close misses, harmed materials or cracked nerves.

The term labour force has been defined by different scholars. According to Jhingan (2016) Labour includes both physical and mental work undertaken for some monetary reward. In other words, it is all efforts of human body or mind undertaken with expectation of monetary reward for those efforts. It follows therefore that the services of doctors, workers working in factories and teachers teaching in schools, etc. are all included in labour. Consequently, any physical or mental work undertaken for pleasure or to attain pleasure is not labour. For example, the activities of a teacher teaching his son, a mother brings up her children and a doctor treating his wife or children, etc. are not regarded as labour in economics.

labour supply is the total hours (adjusted for intensity of effort) that workers wish to work at a given real wage rate. It is frequently represented graphically by a labour supply curve, which shows hypothetical wage rates plotted vertically and the amount of labour that an individual or group of individuals is willing to supply at that wage rate plotted horizontally. In other words, supply of labour, mean the various numbers of workers of a given type of labour which would offer themselves for employment at various wage rates (Fagge & Zakari, 2020). Thus, there are three distinct aspects to labour supply or expected hours of work: the fraction of the population who are employed, the average number of hours worked by those that are employed, and the average number of hours worked in the population as a whole. Labour supply at a given point of time comprises all currently employed persons and unemployed persons currently available for work and seeking work (Hoffmann, 1992). Labour supply is thus synonymous with the labour force.

These definitions conform closely to the international standard definitions specified by the International Labour Organization. Thus, the labour force participation rates (LFPR) and the Not in the Labour force rate (NLFR) are defined as:

$$\text{LFPR} = \text{Labour Force/Working Age Population} \times 100$$

$$\text{NLFR} = \text{Not in the Labour Force/Working Age Population} \times 100$$

2.2 Theoretical Framework

The study was anchored on the Human Capital Theory (HCT) posits that labour is not just a factor of production, but also a valuable asset that requires investment in education, training, and health to enhance productivity (Becker, 1964). This theory is particularly relevant to the study of the effect of road traffic crashes (RTCs) on labour participation rates. RTCs can lead to injuries, disabilities, and even fatalities, resulting in a loss of human capital and a decline in labour participation rates. The economic burden of RTCs is substantial, with estimated costs including medical expenses, lost productivity, and damage to property (NHTSA, 2020). Furthermore, RTCs can also have long-term consequences on labour market outcomes, including reduced employment opportunities, lower earnings, and decreased economic growth (WHO, 2018).

This study investigates the impact of RTCs on labour participation rates, using the Human Capital Theory as a framework. By examining the relationship between RTCs and labour market outcomes, this study seeks to contribute to the understanding of the economic consequences of RTCs and inform policy interventions aimed at reducing the burden of RTCs on labour markets.

Empirical Review

Tandrayen-Ragoobur (2024) investigated the impact of number of road traffic accidents and the injuries sustained from it by different individuals on GDP in the small island of Mauritius. Mauritius, having perceived an important structural transformation over the past decades, is witnessing a rise in road accidents and injuries, which is a concern in terms of economic costs. In addition, it is a small island nation with limited road infrastructure, making it vulnerable to traffic congestion and accidents. The paper provides

important insights for other island countries with similar geographic challenges. The Vector Error Correction Model (VECM) approach is used to assessing the existence of a long-run relationship between road traffic accidents and GDP in Mauritius from 1980 to 2020. In addition to road crashes, different levels of injury severity linked to road accidents are evaluated. The results reveal that on average a 1% rise in road accidents leads to a 0.42% fall in real GDP. Further, a 1% rise in casualties linked to road accidents is likely to cause a 0.18% decline in GDP.

Hussaini, Geidam and Kachalla (2023) assessed the impact of road traffic crashes on living condition of the people in Yobe state, Nigeria and observed that Road crashes have become a major concern in relation with global public health issues. From the survey conducted on the causes of road accident and consequences in Yobe state in seven major motor parks in the state, majority of the accidents happened as a result of driver high speed, road conditions, driving age (21-24), pedestrian behavior when crossing the road, driver education status, driver experience and trucks driven which carries no any sign of alert on their vehicle while on the road. The consequences of the crashes include loss of valuable and properties mainly the vehicles and disabilities resulting from injuries. The researcher recommended that high speed limitation and severe verdicts on violation of the law, improve road conditions in the state, training and orientation to drivers on the road rules and regulation, change the pedestrians' behavior toward the use of road and re-enforced all roads agencies to do their work.

Razzaque, Runa and Hossain (2023) examined the effect of road traffic crashes on the socio-economic condition of the people in Bangladesh and found out that road traffic crashes are a major public health concern in Bangladesh, causing significant harm to individuals and society as a whole. Despite various initiatives taken by the government, the number of road crashes continues to increase, highlighting the need for a legal approach to address this issue. The study found that the current legal framework in Bangladesh contains several provisions aimed at promoting road safety, including the Bangladesh Road Transport Act, the Bangladesh Road Transport Corporation Act, and the Bangladesh Road Transport Authority Act.

3. Methodology

The study adopted ex-post facto design to investigate the effect of road traffic crashes on labour participation rate in Nigeria during the 1988-2023. To this end, the study utilized secondary data based on variables of the study. The method of analysis was based on cointegration to carry out the investigation. The Dynamic Ordinary Least Squares (DOLS) model and Granger Causality tests was employed to determine the causal elements in the parameters. The data were collected from various sources including Central Bank of Nigeria (CBN), Federal Road Safety Commission (FRSC) annual reports, World Development Indicator (WDI) database and National Bureau of Statistics (NBS).

This study adapted the model of Razzaque, Runa and Hossain (2023) which examined the effect of road traffic crashes on the socio-economic condition of the people in Bangladesh using DOLS model. Their functional form of model was stated thus:

$$LXP = f(NOD, NOA, NOD) \quad (1)$$

Their econometric form of model was stated as follows:

$$LXP = \beta_0 + \beta_1 NOD_t + \beta_2 NOA_t + \beta_3 NOD + e_t \dots (2)$$

Where,

LXP = Life Expectancy

NOD = Number of Death

NOA = Number of Accident

NOD = Number of Damage Vehicles

Equation 2 was modified by replacing its variables with those of this current study and restated thus:

$$LFPR = \beta_0 + \beta_1 FRTC + \beta_2 PKRC + \beta_3 PIRC + \beta_4 VDRC + \mu_i \dots (3)$$

Where:

LFPR = Labour Force Participation Rate

FRTC = Frequency of Road Traffic Crashes

PKRC = People killed in Road Traffic Crashes

PIRC = People injured in Road Traffic Crashes

VDRC = Vehicles damaged in Road Traffic Crashes

β_0 = Constant intercept coefficient.

μ_i = Error term

$\beta_1, \beta_2, \beta_3, \& \beta_4$, = coefficient of the independent variables which explains the effect of an average change in dependable variable associated with a unit change in the independent variable.

The model a priori expectation is that the estimated parameters $\beta_1, \beta_2, \beta_3$, and $\beta_4 < 0$ or negatively sign. In line with economic theory, it is expected that road traffic crashes, negatively related to labour force participation rate.

4. Results and Discussion

The data use for the study is presented in appendix 'A' attached. These include annual time series on Labour Force Participation Rate (LFPR), Frequency of Road Traffic Crashes (FRTC), People killed in Road Traffic Crashes (PKRTC), People injured in Road Traffic Crashes (PIRTC), and Vehicles damaged in Road Traffic Crashes (VDRTC) for the period 1988 – 2023. Appendix 'B' is the regression results.

Table 1: Augmented Dickey-Fuller (ADF) Test Results

Variables	ADF statistics	T-Value	T-Critical Value @ 5%	P – Value	Decision	Order of Integration
LFPR	-3.902966		-3.548490	0.0228	Reject H_0	I(1)
RTCC	-6.318579		-3.548490	0.0000	Reject H_0	I(1)
RTCFR	-6-323703		-3.548490	0.0000	Reject H_0	I(1)
RTCIR	-5.645715		-3.548490	0.0003	Reject H_0	I(1)
RTCVD	-6.588403		-3.548490	0.0000	Reject H_0	I(1)

Source: Author's Computation 2024, using E-view 12.0 version

This study established the order of integration of the individual time series through the unit root tests. The ADF statistics when tested at a level 1(0) are less (in absolute terms) than their 5% critical values, this means that the data when tested at a level has a unit root and is non-stationery. Consequently, further testing to first difference was carried out.

It can be seen from table 1 that LFPR, RTCC, RTCFR, RTCIR and RTCVD were found to be stationery at first difference, that is, at order 1(1). The ADF statistics of LFPR (-3.902966), RTCC (-6.318579), RTCFR (-6-323703), RTCIR (-5.645715) and RTCVD (-6.588403) are greater (in absolute terms) than their respective critical tabulated values of (-3.548490), (-3.548490), (-3.548490), (-3.548490) and (-3.548490) at 0.05 respectively and therefore H_0 was rejected.

This implies that the data have no unit root or becomes stationery. Also, the p-values of the variables are all below the 0.05 significant level of this study. Generally, the unit root tests results of the variables under study have a stochastic trend and therefore, good

for inclusion in the model for parameter estimation. The Johansen approach to co-integration is thus applied by this study to determine the long run relationship among the variables, since they were found to be stationery at first order 1(1).

**Table 2: Johansen Cointegration Test Results
Unrestricted Cointegration Rank Test (Trace and Max-Eigen)**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
None *	0.972093	219.9932	69.81889	110.9454	33.87687
At most 1 *	0.788933	109.0478	47.85613	48.22293	27.58434
At most 2 *	0.728686	60.82488	29.79707	40.43885	21.13162
At most 3 *	0.470670	20.38603	15.49471	19.72045	14.26460
At most 4	0.021241	0.665574	3.841465	0.665574	3.841465

Trace test indicates 4 cointegratingeqn(s) at the 0.05 level

Max-eigenvalue test indicates 4 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Source: Author's Computation 2024, using E-view 12.0 version

An examination of table 2 showed that both the trace and Max-Eigen value statistics showed existence of four unique co-integrating equations between the variables; RTCC, RTCFR, RTCIR, RTCVD and LFPR at 5 percent level. The test shows that Trace of none (219.9932), at most 1 (109.0478), at most 2 (60.82488) and at most 3(20.38603)are greater than their respective 0.05 critical values of (69.81889),(47.85613),(29.79707) and (15.49471) respectively. In the same vein, the test also shows that Eigen none (110.9454) and at most 1 (48.22293),at

most 2(40.438850) and at most 3(19.72045) are greater than their respective 0.05 critical values of (33.87687), (27.58434), (21.13162) and(14.26460) respectively. Thus, it can be concluded that since four co-integrating equation were found in the model, there is a long-run relationship between road traffic crashes cases (RTCC), road traffic crashes fatality rate (RTCFR), road traffic crashes injuries rate (RTCIR), road traffic crashes vehicles damage RTCVD and the labour force in Nigeria during the 1988-2023.

Table 3: Descriptive Statistics Analysis Result

	LFPR	RTCC	RTCFR	RTCIR	RTCVD
Mean	49.47222	14708.89	10795.81	21867.42	7268.528
Median	46.75000	13619.50	6595.500	22449.00	0.000000
Maximum	78.50000	25792.00	38930.00	41165.00	22327.00
Minimum	27.00000	8477.000	4519.000	5081.000	0.000000
Std. Dev.	15.96467	4818.682	10274.62	9898.892	9051.857
Skewness	0.344399	0.692024	2.043114	0.061675	0.530763
Kurtosis	1.840847	2.422089	5.409589	2.394801	1.476916
Jarque-Bera	2.727116	3.374359	33.75507	0.572222	5.169935
Probability	0.255749	0.185041	0.000000	0.751179	0.075399
Sum	1781.000	529520.0	388649.0	787227.0	261667.0
Sum Sq. Dev.	8920.472	8.13E+08	3.69E+09	3.43E+09	2.87E+09
Observations	36	36	36	36	36

Source: Author's Computation 2024, using E-view 12.0 version

The descriptive statistics reveal interesting insights into the variables. The Labour Force Participation Rate (LFPR) has a mean of 49.47%, indicating that approximately half of the population participates in the labour market. The median LFPR is slightly lower at 46.75%, suggesting a slight skewness to the right. The Road Traffic Crashes Cases (RTCC) variable has a high mean of 14,708.89, indicating a significant

number of crashes. The Road Traffic Crashes Fatality Rate (RTCFR) and Road Traffic Crashes Injuries Rate (RTCIR) variables have means of 10,795.81 and 21,867.42, respectively, highlighting the severity of the crashes. The Road Traffic Crashes Vehicles Damage (RTCVD) variable has a mean of 7,268.53, indicating significant damage to vehicles. The skewness and kurtosis values suggest that most variables are not normally distributed, except for

LFPR. The Jarque-Bera test confirms this, with only RTCFR rejecting the null hypothesis of normality. Overall, these statistics provide a foundation for

further analysis into the relationships between these variables.

Table 4: Pairwise Granger Causality Test Results

Null Hypothesis:	Obs	F-Statistic	Prob.	Decision	Nature of Causality
RTCC does not Granger Cause LFPR	34	1.76258	0.1895	Accept H_0	Bidirectional
LFPR does not Granger Cause RTCC		0.44781	0.6434	Accept H_0	
RTCVR does not Granger Cause LFPR	34	7.48129	0.0024	Reject H_0	Unidirectional
LFPR does not Granger Cause RTCVR		1.93976	0.1619	Accept H_0	
RTCIR does not Granger Cause LFPR	34	8.63310	0.0011	Reject H_0	Unidirectional
LFPR does not Granger Cause RTCIR		0.45897	0.6364	Accept H_0	
RTCVD does not Granger Cause LFPR	34	0.58123	0.5656	Accept H_0	Bidirectional
LFPR does not Granger Cause RTCVD		2.35657	0.1126	Accept H_0	

Source: Author's Computation 2024, using E-view 12.0 version

The Granger causality test results provide insights into the causal relationships between the variables. The test examines whether one variable can be used to forecast another variable. The results show that:

Road Traffic Crashes Cases (RTCC) does not Granger cause Labour Force Participation Rate (LFPR), indicating that RTCC does not have a significant impact on LFPR. The bidirectional causality suggests that both variables may be influenced by other factors.

RTCVR (Road Traffic Crashes Fatality Rate) and RTCIR (Road Traffic Crashes Injuries Rate) both Granger cause LFPR, indicating that these variables

have a significant impact on LFPR. The unidirectional causality suggests that RTCVR and RTCIR are leading indicators of LFPR.

RTCVD (Road Traffic Crashes Vehicles Damage) does not Granger cause LFPR, indicating that RTCVD does not have a significant impact on LFPR. The bidirectional causality suggests that both variables may be influenced by other factors.

Overall, the results suggest that RTCVR and RTCIR have a significant impact on LFPR, while RTCC and RTCVD do not. These findings can inform policymakers and stakeholders about the potential consequences of road traffic crashes on labour market outcomes.

Table 5: Dynamic Least Squares Model (DOLS) Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTCC	-0.770343	0.000242	-8.024468	0.0000
RTCVR	0.286160	0.000248	2.990253	0.0087
RTCIR	-0.161801	0.000210	1.243384	0.2316
RTCVD	0.197159	0.000249	2.346356	0.0322
C	60.88482	4.327251	14.07009	0.0000
R-squared	0.990712	Mean dependent var		49.92424
Adjusted R-squared	0.981425	S.D. dependent var		14.90078
S.E. of regression	2.030840	Sum squared resid		65.98901
Long-run variance	6.540334			

Source: Author's Computation 2024, using E-view 12.0 version

The DOLS model examines the long-run relationships between the variables. The results show:

RTCC (Road Traffic Crashes Cases) has a negative and significant coefficient (-0.770343) at the 5% level (Prob = 0.0000). This indicates that a 1-unit increase in RTCC is associated with a 0.77-unit decrease in LFPR (Labour Force Participation Rate).

The magnitude of the coefficient suggests a moderate relationship between RTCC and LFPR.

RTCVR (Road Traffic Crashes Fatality Rate) has a positive and significant coefficient (0.286160) at the 5% level (Prob = 0.0087). This indicates that a 1-unit increase in RTCVR is associated with a 0.29-unit increase in LFPR. The magnitude of the coefficient suggests a weak relationship between RTCVR and

LFPR.

RTCIR (Road Traffic Crashes Injuries Rate) has a negative but insignificant coefficient (-0.161801) at the 5% level (Prob = 0.2316). This indicates that the relationship between RTCIR and LFPR is not statistically significant.

RTCVD (Road Traffic Crashes Vehicles Damage) has a positive and significant coefficient (0.197159) at the 5% level (Prob = 0.0322). This indicates that a 1-unit increase in RTCVD is associated with a 0.20-unit increase in LFPR. The magnitude of the coefficient suggests a weak relationship between RTCVD and LFPR.

The constant term (C) is positive and significant (60.88482) at the 5% level (Prob = 0.0000),

indicating that there is a positive intercept in the relationship between the variables.

The R-squared (0.990712) and Adjusted R-squared (0.981425) values indicate that the model explains approximately 99% of the variation in LFPR. The Standard Error of the regression (2.030840) is relatively low, indicating that the model provides a good fit to the data. The Long-run variance (6.540334) indicates that the model captures the long-run relationships between the variables.

The graphical investigation of the stability of the estimated coefficient of the error correction model, a graphical representation of the Cumulative Sum (CUSUM) is shown below:

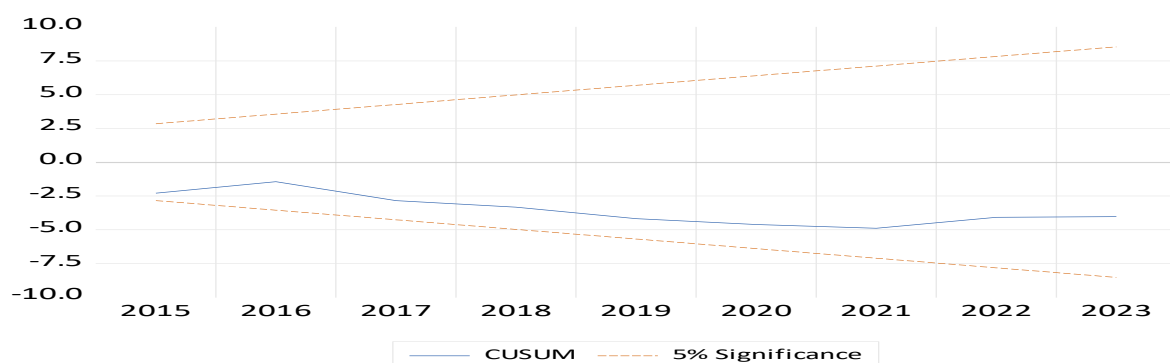


Figure 1: cumulative sum of the recursive residuals (CUSUM) Test Plot

Source: Author's Computation 2024, using E-view 12.0 version

The above graph shows that the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) of the recursive residuals lies between the two critical (red) lines at 5% level of significance. Consequently, we reject H_0 of no parameter stability and conclude that the variable's parameters are stable and the model is stable for long-run forecasting. The plot of the graph implies that the estimates are dynamically and structurally stable, consistent and reliable.

4.1 Discussion of Findings

The result of this study revealed that road traffic crashes cases (RTCC) has statistically significant negative effect on the labour force participation rate in Nigeria. This means that a rise in the number of road traffic crashes cases (RTCC) will bring about a proportional decrease in the labour force participation rate in Nigeria during the period under review. This finding is in line with the findings by Umar, Bashir & Abdurrauf (2017) who found out that between 2009 and

2015 alone, 642 cases of road traffic crashes were recorded in Kano metropolis involving 3,019 people, Olawole (2018) that found out that a total 1,060,507 road traffic crashes cases were recorded in Nigeria from 1960 – 2012 and Oyetunji, Oladeji, Falana & Idowu (2017) that reported that at least 162 persons out of 100,000 Nigerians are regular victims of road traffic crashes. It is important to note these crashes in most case brought about blockage of the roads which results in the loss of man hours and productivity loss that negatively affects the labour force participation rate.

The study also found out that road traffic crashes fatalities rate (RTCFR) has statistically significant positive relationship with the labour force participation rate in Nigeria. This means that road traffic crashes (RTCFR) increases as the labour force participation rate in the same proportion. The finding of this study is inconsistent with the empirical review. Abokhense, Yisa, Abokhense, Akanbi, Aka and Mondighs (2013) found out that 473 persons died from 1,115 crashes in Nigeria in 2012 and 142 people died in April, 2013 alone identifying death from RTCs as the

third cause of death in Nigeria with severe consequences on the people. Afolabi and Kolawole (2017) that found out that the premature death of Nigerians as a result of road traffic crashes brings about social disruptions and loss of productivity. According to Atubi (2017) the death of bread winners results in stain and depletion in the economic fortunes of the respective families. This is because the deceased will not be available to work and earn income to take care of the people they left behind.

The study found that road traffic crashes injuries rate (RTCIR) has negative insignificant statistical effect on the labour force participation rate in Nigeria during the period under review. This implies that a rise in the number of people injured by road traffic crashes (RTCIR) will bring about a decrease in labour force participation rate in Nigeria during the period under review but less than the proportional increase in LFPR. This finding is in line with the findings by Aderemo (2012), Atubi (2017), and Labinjo, Juillard, Kobusinggye and Hyder (2009) who found out that about 4 million Nigerians may be injured and as many as 20,000 potentially killed annually in Nigeria. Juillard, Labinjo, Kobusinggye and Hyder (2010) found out of 3082 subjects who had suffered road traffic injuries, 127 were disabled. Their study further revealed that road traffic injuries resulted in disability for 29.1% while 13.5% were unable to return to work. Of the disabled people, 67.6% were unable to perform activities of daily living, 16.7% consequently lost their jobs and 86.6% had a reduction in earnings. These consequences would no doubt bring about a reduction in socio-economic development in Nigeria during the period.

It was also found that road traffic crashes vehicles damage (RTCVD) has positive and significant statistical relationship with labour force participation rate in Nigeria for the period under review. This implies that that road traffic crashes vehicles damage (RTCVD) increases as the labour force participation rate in the same proportion. This finding is inconsistent with empirical studies. The reason for this could be that substantial vehicle loss resulting from road traffic crashes in Nigeria from 1988-2008 was not recorded and hence not available for further analysis.

5. Conclusion and Recommendations

This study reviewed different literature on the effect of road traffic crashes. Specifically, the study examined the effect of road traffic crashes on labour force

participation rate in Nigeria for the period from 1988-2023. The unit root and co-integration tests results revealed that the variables were co-integrated in the long run. As a result of the foregoing, the model of the study was analyzed using dynamic ordinary least squares (DOLS) analysis. The results of the findings revealed that road traffic crashes cases (RTCC) have a negative and significant effect on labour force participation rate in Nigeria for the period under review. This means that an increase in the number of road traffic crashes cases will bring about a proportionate decrease in labour force participation rate. The empirical results of the study have significant policy implications for Nigeria and are subject to wide interpretations by policy makers.

- i. The Federal Road Safety Corps (FRSC) as a lead agency in road traffic management and administration in Nigeria should increase its efforts in public education on good road use behaviour and effective enforcement of road traffic rules and regulations with appropriate sanctions for violations so as to checkmate inappropriate driver behaviours on the roads like over-speeding, drunk driving, driving under the influence of drugs, dangerous driving, wrongful overtaking, overloading and lack of regular maintenance of vehicles among others. Also, proper road design and provision of road layouts, speed limiters and pedestrian facilities should be provided by the respective government agencies charged with the responsibilities. In addition, the three phases Haddon matrix of pre-crash, crash and post-crash should be utilized in addition to the full implementation of the Nigerian Road Safety Strategy (2021 – 2030) for Nigeria. These measures would help to reduce road traffic crashes cases and consequently reverse the negative effect of road traffic crashes on labour supply and labour force participation rate in the country.
- ii. More efforts should be put in place by the Federal Government of Nigeria through the FRSC as the lead agency in road traffic management and administration in Nigeria, the sub-nationals through the states road traffic management agencies and other stakeholders for the attainment of the United Nations goal for the attainment of zero road traffic crash fatality by 2030. The implementation of the crash phase of the Haddon matrix should be taken seriously through enforcement of the compulsory use of safety devices in the vehicles like use of restraints,

occupant restraints, crash protective design and the provision of crash protective roadside objects. This will prevent death from road traffic crashes in case they occur and further improve on labour supply and the labour force participation rate in the country.

- iii. More efforts to promote recoveries and prevent injuries resulting from road crashes from getting worse through the provision of post-crash care in line with the principles of Haddon matrix should be intensified by the FRSC. This can be done through the provision of more training on first-aid skills for the road safety patrol men, provision of more rescue facilities and road side clinics to ease access of immediate care and reduce congestion. These measures would increase life expectancy and consequently reverse the negative effect on the country's labour force.
- iv. There is also the need for the provision of comprehensive insurance for all categories of commercial and government vehicles. This should

be made compulsory in order to guarantee replacement of damaged vehicles as a result of road traffic crashes. Other vehicle owners should also be encouraged to migrate from third party to comprehensive insurance. With this in place, the vehicles that are damaged from road traffic crashes would be replaced and hence provide means of employment to the drivers thereby increasing the labour force participation rate in Nigeria.

- v. There is need for policy makers in Nigeria to consider the utilization of a certain percentage of road taxes and donations by international donors for funding of health emergencies to support road safety activities particularly for the provision of prompt rescue services to victims of road traffic crashes. The saving of lives and prevention of injuries from getting worse will no doubt make more people available for employment thereby improving the labour force participation rate in the country.

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