Risk Factors of Road Traffic Accidents (RTAs) among Commercial Inter-State Drivers in Lagos State, Nigeria

By Ogunnaike Adewale Adeyemi & Adewole D.A

University of Ibadan

Abstract- Background: Road Traffic Accidents (RTAs) constitute a major public health problem globally with its effects felt more in low and middle income countries (LMICs). Millions of lives, globally, are lost annually and several others are disabled following RTAs with human, vehicular and road environment being identified by literatures as the common risk factors of RTAs. The Federal Road Safety Commission (FRSC) of Nigeria reported in 2014 that an estimated 1,991 lives were lost to RTAs in Lagos, Nigeria alone in the preceding four years. The majority of the populations affected in RTAs are within active working age group.

Aim: This study was therefore designed to identify and discuss these risk factors as well as assess respondents' knowledge about road traffic signs.

Methods: A descriptive cross-sectional survey was carried out among 422 consenting commercial drivers in Lagos state with a pretested, semi-structured interviewer-administered questionnaire.

Statistical Analysis: Data were analysed using descriptive statistics, chi-square test and logistic regression with significance determined at p≤0.05.

Keywords: road traffic accidents (RTAs), risk factors, road traffic signs, perception.

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Ogunnaike Adewale Adeyemi [α] & Adewole D.A [σ]

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Results: Age of the respondents was 44.0±10.3 years. Majority were married with only 8.1% with tertiary education. The reported case of RTAs among the respondents' was 40%. Other road users' faults and brake failure were reported as the main human and vehicular contributors to RTAs occurrence. Majority of the RTAs occurredon tarred, two-carriage roads. Generally, respondents had good knowledge of regulatory road traffic signs than the warning road traffic signs. History of arrest for traffic offences (OR = 1.8, 95% C.I = 1.1-2.9, p = 0.021) and use of alcohol (OR = 1.8, 95% C.I= 1.0-3.0, p = 0.036) were identified as predictors of involvement in RTAs in this survey.

Conclusion and Recommendation: Considering the various health, social, economic and psychosocial impacts of RTAs on individuals, families, nation and global community; targeted awareness to improve the knowledge of drivers on road safety measures and enforcement of traffic regulations by road regulatory agencies are needed to curb RTAs occurrence.

Keywords: *road traffic accidents (RTAs), risk factors, road traffic signs, perception.*

Author α σ: Department of Health Policy & Management, College of Medicine, University of Ibadan, Nigeria.
e-mail: adewalecaxton@gmail.com

I. Introduction

a) Background

i. RTAs

Road Traffic Accidents (RTAs), classified as a non-communicable disease, as for a long time received less attention to other diseases in its categories despite the fact that a WHO data in 2002 reported that nearly 1.2 million deaths occurred globally from RTAs with low and middle income countries (LMICs) suffering 85% of the impact. This, in part, may be due to the assumption that RTAs are spontaneous and unavoidable occurrences; an assertion that has been voided by literatures through identification of the risk factors of RTAs- Human, Vehicular and Road environment sources. More than half of those killed in RTAs are in the productive age group, 15-44years, especially males who are the economic backbone of most families which point to the impact this neglected public health issue has on the economy of LMICs and especially the low-income groups whose earning capacity is mostly dependent on their physical activity (Global disease burden, 2002) (WHO, 1996).

Having considered the extent of the impact of RTAs especially on the LMICs and a possibility of combating the menace provided by the Declaration of the UN through the Goal of the Decade of Action for Road Safety 2011-2020 that identifying and addressing the risk factors of road traffic accidents and provision of adequate post-crash care will reduce the rate of occurrence of RTAs, this survey was carried out to identify these risk factors as opposed to other studies that have studied these risk factors in part. The knowledge of the respondents about road traffic signs was also surveyed.In view of these, this survey aimed at providing raw evidence for policy-makers willing to make informed decisions in ensuring the safety of our traffic systems and saving as much as 5 million lives as targeted by the Decade of Action for Road Safety 2011-2020.

II. Materials and Methods

This survey was a descriptive cross-sectional survey carried out among 422 (sample size of 425 was derived after using a prevalence of 21% reported by

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Adekoya et al., (2011) and adjusting for clustering effect and non-response rate) commercial inter-state drivers across ten randomly selected LGAs in Lagos State, Nigeria. Ethical approval was obtained from the UI/UCH ERC before commencement of this study. Permission was obtained from Lagos State Ministry of Transport and the NURTW, Lagos branch. Participation of the drivers was entirely voluntary and those who decided to withdraw during the study were permitted to do so.

The questionnaire used for this survey was developed following review of related literatures on the subject matter which was followed by a pretest among 45 commercial inter-state drivers in Ibadan. The questionnaire was translated to Yoruba language (being the major language of the study area) and back-translated to English language to ensure construct validity of the questionnaire. Valid informed consent was sought from eligible respondents (registered with the park under study and having commercial driving experience of three or more years). To gain respondents maximum attention, it was ensured that the respondents weren't the next to load passengers.

The data were analysed using SPSS v16, Chi-square test was used to measure association between selected categorical variables while logistic regression was used to control for confounding variables by bringing factors significant at $p \leq 0.20$ at bivariate level into the logistic regression model. A $P < 0.05$ was regarded as statistically significant.

III. Result

a) Socio-demographic information about respondents

422 commercial inter-state drivers representing 99% response rate were recruited for this survey with mean age of respondents being 44.0 ± 10.3 years with majority, 82.7%, being married and only 50.0% or more of the respondents having secondary and/or post-secondary school education. More than 50% of the respondents have spent 15 years or more on the job with mean job years being 15.5 ± 8.2 years while 90% of the respondents have no formal driving school experience.

Table 3.1: Socio-demographic characteristics of respondents (N=422)

Variable	Percentage (%)
Age (years)(n=417)	
≤30	10.3
31-50	67.9
51-60	14.6
≥61	7.2
Mean ± SD	44.0 ± 10.3
Marital status	
Single	9.5
Married	82.7
Other	7.8
Religion	
Christian	40.3
Islam	52.8
Traditionalist	5.2
Other	1.7
Educational status	
None	19.0
Primary	31.0
Secondary	41.9
Post-secondary	8.1
Ethnicity	
Yoruba	76.1
Igbo	2.4
Hausa	0.7
Others	20.9

b) History of RTAs and associated risk factors

40% of the respondents reported ever been involved in RTA. The type of RTA reported by the respondents included head-on collision 28(19.7%), rear-end collision 47(33.1%), rollovers 13(9.2%), side collision 26(18.3%) and single vehicle/lone accident 28(19.7%) with almost half, 49.3%, of the RTAs occurring in the afternoon. About two-third (65.5%) of these RTAs involved no body injury. One-quarter of these RTAs were blamed on other road users, this was followed closely by faulty vehicle in 23.2% of the cases. Brake failure, 45.5%, was the most reported vehicular defect that resulted in the RTAs. Half of the reported RTA occurred on two-carriage ways while most of the RTAs, 60.6%, occurred on tarred two-carriage roads with 54.9% occurring when the weather was clear.

Table 3.2: History of RTAs and associated risk factors

Variable	Percentage (%)
Involvement in RTA	
Yes	40.0
No	60.0
Type of RTA in the last 3 years (n=142)	
Head-on collision	19.7
Rear-end collision	33.1
Rollovers	9.2
Side collision	18.3
Single vehicle/lone accident	19.7
Time of the day RTA occurred (n=142)	
Morning	19.7
Afternoon	49.3
Evening	31.0
Cause of most recent RTA (n=142)	
Poor vision of driver	11.3
Over-speeding	11.3
Distraction/phone call	4.2
Improper/wrong overtaking	6.3
Fatigue/Sleepiness	5.6
Faulty vehicle	23.2
Wrong use of trafficator	4.2
Pedestrian fault	2.1
Other drivers fault	26.1
Others	5.6
Vehicular defect that caused RTA (n=33)	
Brake failure	45.5
Steering lock	12.1
Tyre burst	27.3
Others	15.2
Type of road RTA occurred (n=142)	
One-carriageway	41.5
Two-carriageway	50.7
One-way (improper route)	7.7
Type of road surface RTA occurred (n=142)	
Tarred good road	60.6
Tarred with potholes	37.3
Earth/Not tarred/Muddy	2.1
Weather when RTA occurred (n=142)	
Clear	54.9
Dusty	7.7
Rainy	28.2
Others	9.2

About 16% of the respondents sometimes or never use the seat-belt when driving while 61.4% of the respondents have history of been arrested by road regulatory authorities (police, Vehicle Inspection Officers, FRSC) with only 23.2% been arrested in the last three months because of over-speeding (15.7%), non-use of seat belt (12.6%), overload of passengers/loads (25.3%) among other reasons.

c) *Knowledge about road traffic signs and perception about risk factors of RTAs*

The knowledge of road traffic signs was high among the respondents. Furthermore, respondents have better knowledge of regulatory signs compared to the warning signs. More than one-quarter of the respondents had no idea about road traffic signs "Roadway narrows".Overall, the respondents' had a favourable perceptionabout the risk factors for RTA. However, 53.5%, 43.9%, 49.2%, 49.4% and 48.6% disagreed that "incompleteness of vehicle registration papers, not using seat-belt, not owning the vehicle being driven, no valid drivers' license and age of driver" respectively were possible risk factors for RTAs.

Table 3.3: Knowledge about Road traffic signs

Variable	Cut-off score	Score	Mean ± SD	Percentage	Remark
Knowledge	10	<10	12.7±3.9	17.8	Poor
		≥10		82.2	Good

d) *Factors associated with involvement in RTA among respondents*

Statistically significant association exist between age (X^2 = 11.56, p = 0.009), years spent on the job (X^2 = 10.94, p = 0.004), seat belt use (X^2 = 23.86, p = <0.0001), being arrested regularly by road regulatory authority (X^2 = 22.56, p = <0.0001) and involvement in RTA.

Table 3.4: Factors associated with involvement in RTA among respondents

Variable	Ever been involved in RTA?				
	Yes (%)	No (%)	Total	X^2	p-value
Age (years)					
≤30	9(20.9)	34(79.1)	43		
31-50	120(42.4)	163(57.6)	283		
51-60	30(49.2)	31(50.8)	61	11.56	
≥61	8(26.7)	22(73.3)	30		0.009*
Highest educational status					
None	25(31.2)	55(68.8)	80		
Primary	50(38.2)	81(61.8)	131		
Secondary	76(42.9)	101(57.1)	177	5.74	0.125
Post-secondary	18(52.9)	16(47.1)	34		
Years spent on the job					
≤5	9(25.7)	26(74.3)	35		
6-14	53(33.1)	107(66.9)	160		0.004*
≥15	107(47.1)	120(52.9)	227	10.94	
Visual/eye check					
Regularly	73(51.0)	70(49.0)	143	8.76	
Rarely	96(36.0)	171(64.0)	267		0.003*
Use of seat-belt					
Everytime	124(35.3)	227(64.7)	351		
Seldom	44(67.7)	21(32.3)	65	23.86	<0.0001*
Arrest by road regulatory authority					
Regularly	127(49.0)	132(51.0)	259		
Rarely	42(25.8)	121(74.2)	163	22.56	<0.0001*
Knowledge score					
Poor knowledge	27(36.5)	47(63.5)	74	0.50	0.479
Good knowledge	140(40.9)	202(59.1)	342		

e) *Predictors of RTAs among respondents*

Following logistic regression; Respondents that report consistent use of seat belt are 5 times less likely to be involved in RTAs than seldom users while respondents that report regular arrest and alcohol use are 1.8 times and 1.7 times more likely respectively to be involved in RTAs than those not being arrested regularly or are not alcohol users. The analysis also showed that smokers of cigarette/cannabis are 2 times less likely to be involved in RTA than non-smokers.

Table 3.5: Predictors of RTAs among respondents

Variable	aOR*	95% C.I**	p value
Marital status			
Single	0.491	0.13-1.84	0.292
Married	0.385	0.15-1.02	0.054*
Others***	REF		
Educational status			
None	REF		
Primary	1.071	0.52-2.21	0.853
Secondary	1.429	0.70-2.91	0.326
Post-secondary	2.394	0.86-6.63	0.093
Years on occupation			
≤5	0.539	0.20-1.46	0.225
6-14	0.544	0.32-0.91	0.021*
≥15	REF		
Seat belt use			
Everytime	0.213	0.11-0.41	<0.0001*
Seldom	REF		
History of arrest			
Yes	1.779	1.09-2.90	0.021*
No	REF		

IV. DISCUSSION

The rate of occurrence of RTAs among the study participants was high, similar to Pepple and Adio (2014) findings though relatively higher when compared to Adekoya et al., (2011) report though this might be becauseAdekoya et al., (2011)covered a period of 10 years whereas this study captured the involvement in RTA all through the driving years of the respondents.

The type of RTA reported majorly by the respondents was rear-end collision with almost half of the RTA occurring in the afternoon with human error being the reported primary cause of most of the RTAs. This was in agreement with most literatures on RTAs which identifies human related factors as the major cause of RTA. This study however disagrees with Bekibele et al., (2007) findings that reported mechanical fault as the main cause of RTAs. Brake failurewas the most reported vehicular defect that resulted in the RTA. It should be noted that about half of the reported RTA occurred on two-carriage ways which disagrees with Arthur, (2015) findings that more RTAs occurred on single carriage ways and surprisingly most of the RTAoccurred on tarred roads with many occurring when the weather was clear. This agrees with Amo, (2014) and Arthur, (2015) both of whom identified that a higher number of crashes were recorded on roads classified as good for transportation. This is probably due to the fact that most drivers tend to over-speed on smooth and wider roads. The high percentage of RTAs that occur when weather was clear contradicts Margie and Scurfield (2004) findings that road crashes among road users in LMICs are mostly influenced by poor visibility.

This study found that respondents had good knowledge about road traffic signs used in the survey which agreed with Hulbert et al., (1979) that reported a similar finding. However, it contradicts Makinde et al., (2012) findings that reported poor knowledge and Okafor et al., (2013) that reported that many of the respondents surveyed had poor knowledge of road traffic signs. The reason of this might be because of the methods of assessment that differs between these studies. Makinde et al., (2012) and Okafor et al., (2013) used multiple choice answers for their assessment while this study allows the respondents to describe what the signs means to them and "right knowledge, wrong knowledge or no idea" was recorded depending on the explanation. Also, Lagos State Government is issuing a State's drivers' permit for inter-state drivers based in Lagos state and were assessed and trained on road traffic signs and other driving skills before been given the permit. This may partly be responsible for the better knowledge among these present study participants.

This study also shows that majority of the respondents had right knowledge for regulatory signs when compared to the warning signs. For the warning signs, Makinde et al.,(2012) reported "Narrow bridge ahead and Dangerous double bend" as the traffic signs with best and poor knowledge respectively, this study identified "Slippery road and Double dangerous bend" as the most wrongly identified and "T-junction" as the traffic sign with the most right knowledge respectively. In addition, this study identified road traffic sign "Roadway narrows" as the sign cited mainly as the one which respondents could not recognise.

For the regulatory signs, Makinde et al., (2012) reported road traffic signs "No U-turn and No parking" for best knowledge and "No overtaking" for poor knowledge, findings which are similar to this study. There was no significant association between road traffic sign knowledge score and involvement in RTAs which agreed with Al-Madani, (2000) and Al-Madani et al., (2002) that also reported no significant association between knowledge of road traffic signs and involvement in RTAs.

This study's respondents identified over-speeding as the major human factor for RTA occurrence which was similar to Arthur (2015) findings that of the behavioural factors studied, speeding had the highest on record for perceived cause of RTAs. Svenson et al., (2012) also agreed that speeding decreases the probability of preventing RTAs for which Aaarts et al., (2006) and Elvik et al., (2004) corroborated. However, it contradicted what Amo (2014) reported by ranking over-speeding as the third contributor to RTAs of the driver/rider error.

In this study, reported cases of RTAs was higher among respondents that are seldom users of seat belt than those that are regular users. This is in consonance with several other studies; Evans and Bloomfield (2004), Cummings et al., (2003), Evans (1986), Huelke and Sherman (1987), Marburger and Friedel (1987), Rivara et al., (1999) that reported the effectiveness of seat belts in reducing the severity of injuries, thus affirming its protective function.

Large number of the respondents in this study who have had history of RTA also reported being arrested by regulatory authorities in the last three months prior to this study. The arrests were as a result of violation of traffic rules which may be responsible for the reported RTAs amongst them.

V. CONCLUSIONS

This study showed that respondents had a good knowledge of the ten road traffic signs sampled in this survey though respondents have better knowledge of regulatory road traffic signs than warning road traffic signs.

This study shows that RTA occurrence was high among inter-state commercial drivers in Lagos State with rear-end collision occurring the most especially in the afternoon though most are without bodily injuries. Brake failure was identified as the most reported

vehicular defect that resulted in RTAs among the respondents with most occurring on tarred two-carriage roads occurring when the weather was clear. Human factor, however, was the major contributory factor identified as the cause of RTAs by this survey. Conclusively, history of arrest by road regulatory agencies (VIO, FRSC, and Police) was identified as a risk factor for RTAs and non-use of seat belts as associated risk factors of RTAs among the respondents of this survey.

VI. Recommendations

1. The knowledge of the drivers on the causes of RTAs should be made better. This can be done by targeted awareness campaign, training and re-training of this category of people.
2. Educating the drivers on the importance of road traffic signs, as cautionary measures, will go a long way in minimising the occurrence of RTAs. The importance of seat-belt use should also be emphasised through these enlightenment medium.
3. Well-funded and methodologically designed researches on risk factors of RTAs and intervention patterns should be carried out on a larger scale.

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