

ORIGINAL ARTICLE

Practice of safety measures among inter-city commercial vehicle drivers in Kwara State, Nigeria

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Keywords

Practice • Safety • Measures • Commercial • Drivers

Summary

Introduction. The incidence of Road Traffic Crashes (RTC) is rising world-wide, with 1.24 million people killed on the world's roads in 2010 due to non-compliance with safety measures. The objectives of the study was to determine the practice of safety measures and prevalence of road crashes among inter-city commercial vehicle drivers in Kwara State, Nigeria.

Methods. A descriptive cross-sectional study done by interviewer-administered questionnaire and blood alcohol concentration of respondents was determined using Breathalyzers. A total of 410 respondents were involved by multi-stage sampling technique; data analysis was done using EPI INFO version 3.5.1 software package. Level of significance was < 0.05 at 95% confidence level.

Results. More than eighty per cent of the respondents practiced safety measures and checked their vehicles before embarking on a

journey. More respondents who practiced safety measures carried out driving test before issuance of license compared with those who did not ($p = 0.001$). Some respondents tested positive for alcohol with mean blood alcohol concentration of $23.28 \pm 23.32 \mu\text{g/dl}$. About a third of the respondents had road traffic crashes in the past.

Conclusions. The drivers demonstrated good safety measures and practices before embarking on a journey. Safety practices were influenced by driving test before issuance of license. Sensitization and orientation of drivers on relevance of driving test before issuance of driving license should be promoted by all stakeholders in road safety. The enforcement of laws by government is critical to addressing challenges of road safety and security by ensuring appropriate driving test before licensing.

Introduction

Motorized road transport among others has changed the face of employment, trade, family life and health care, bringing benefits that were unimaginable 100 years ago. However, the price being paid as a result of road traffic injury for such benefits is too high. Worldwide, Road Traffic Crashes (RTC) lead to death and disability as well as high financial cost to the individual involved, family, community and society at large. The incidence of RTC is rising world-wide, in 2004, about 1.2 million people were known to die in road accidents worldwide [1] and 1.24 million people were killed on the world's roads in 2010 [2].

More than half the people killed in traffic crashes are young adults aged between 15 and 44 years, often the breadwinners in a family. In Nigeria, a study conducted in Ilorin, Kwara State revealed that over three-quarters of the victims of road traffic crashes are young people [3]. Furthermore, road traffic injuries cost low-income and middle-income countries between 1% and 2% of their gross national product, more than the total development aid received by these countries [1]. Enormous human potential was being destroyed, with grave social and economic consequences [1]. Losses are not limited to reduced worker productivity and trauma affecting a victim's private life.

Equally significant are the rising costs in health services and the added burden on public finances.

The negligence of safety practices among motorists is one of the major factors affecting road traffic crashes. Vehicles are poorly maintained due to poverty, ignorance and corruption among enforcement agents and other stakeholders [4]. In 2013, WHO reported that deaths from road traffic crash in 2010 were 33.7/100,000 (Nigeria), 22.2/100,000 (Ghana) and 31.2/100,000 (South Africa). Among behavioural factors, alcohol plays an important role in car crashes, and accidents involving alcohol are more likely to result in injuries and deaths than crashes where alcohol is not a factor. Traffic laws such as National drink-driving law, drink-driving law defined by Blood Alcohol Concentration (BAC) and random breath testing at police check point used for enforcement are available in the countries however, the effectiveness of overall enforcement (respondent consensus: scale 0-10) vary between the three countries. While Ghana had a score of 3, Nigeria and South Africa had a score of 2 [2]. Despite global progress in strengthening drink-driving legislation, only 39 countries have their enforcement as "good" (8 or above on a scale of 0 to 10), indicating that better implementation of these laws needs urgent attention [5]. The objective of this study was therefore, to determine the safety practices of inter-city commercial drivers in Kwara State, Nigeria.

Methods

The study was conducted in Kwara State, Nigeria. The State is one of the 36 states in the country located in the North central geo-political zone of the country. It was a descriptive cross-sectional study of road safety practices among inter-city commercial drivers in Kwara State, Nigeria. About 95% of the drivers in the State were licensed to drive. Quantitative data was collected using an interviewer administered questionnaire and blood alcohol concentration of respondents was determined using Breathalyzers. The questionnaire was pre-tested in a neighboring Oyo State which is 45 km to the study sites. Corrections and validation were done based on the outcome of the pre-test. The validation was done by senior researchers in the University. Only commercial drivers registered with Kwara State Chapters of the respective associations and those whose primary occupation or main source of livelihood is driving, and convey passengers on inter-city with motor vehicles which could be buses or cars were involved in the study. A total of 410 respondents were used for the study.

The study was carried out in the three senatorial districts of Kwara State. Proportional allocation of respondents was done based on population from each senatorial district. Multi-stage sampling technique was used. In stage one, simple random sampling technique using the balloting method was adopted to select four major parks in each of the Kwara Senatorial districts. In each of the parks selected, systematic sampling method was used to select desired number of respondents among commercial drivers based on proportional allocation. The list of the drivers in the selected parks served as the sampling frame. Replacement with the next person on the sampling frame was done for those not available or unwilling to participate in the study. Breathalyzer was used to determine the Blood Alcohol Concentration (BAC) of the commercial vehicle drivers. This assessment was done in a room within the garage office of the drivers to ensure confidentiality. The measurements were done by the Researcher and supported by two research assistants who are medical doctors in postgraduate training. The test subject must be able to provide the required minimum respiratory volume of 1.2 L. for this purpose; the breathing flow must be constant for a certain minimum blowing period [6].

The sampling is automatically triggered after reaching the minimum respiratory volume and the minimum blowing period. The test subject must breathe evenly and continuously in to the mouthpiece [6]. A continuous tone sounds and the green lamp flashes when a sufficient breathing flow volume has been reached. "Blow" appears on the display while the breath sample is taken.

After delivering a sufficient breath sample, the green lamp goes out and the continuous tone falls silent. "Wait Analyzing" appears on the display. After 5 to 25 seconds (depending on the device temperature and the measured concentration), the measuring result appears on the display [6]. The accuracy of the Drager AG and Co breathalyzer used was > 98%.

Data was collected and edited manually to detect omission and to ensure uniform coding, after which data was entered into the computer. Data analysis was done using EPI INFO version 3.5.1 and SPSS software package. Important variables from data collected were presented as frequency tables, and cross tabulation. An appropriate test of significance (Chi-square, t test) were used to test statistics and the level of significance was predetermined at less than 0.05 at 95% confidence level. Ethical approval for study was obtained from the Ethical Review Committee, University of Ilorin. Permission was sought from the different motor parks chairmen. Informed consent was obtained before interview from the respondents while explaining that any information provided would be confidential. The purpose and benefits of the study were explained accordingly.

Results

In Table I, the mean age of the respondents was 46.7 ± 11.27 years. Men constituted 99.8% of the respondents. Majority 370 (90.3%) of respondents were Muslims and Yoruba ethnicity accounted for 387 (94.4%) respondents. On literacy level, 18 (4.4%) had tertiary, 103 (25.1%) secondary and 123 (30.0%) had no formal education. Majority 94.6% were married, 2.2% were widowers and 3.2% were single. Participation was 100%.

From Table II, majority of the respondents practiced safety measures which include obeying speed limit 339 (82.7%), obeying traffic light 363 (88.5%), observing road signs 367 (89.5%), using belts 351 (85.6%), resting when fatigued 355 (86.6%), maintaining the vehicle in good condition 368 (89.8%), and not ingesting alcohol while driving 361 (88.0%).

Concerning safety checks of the vehicles, majority of the respondents checked water level in radiator 371 (90.5%), lighting system 371 (90.5%), brakes and clutches 372 (90.7%), horns and spare tyre 370 (90.2%) as seen in Table III.

In Table IV, about half 210 (51.2%) of the respondent that had good safety practices were on the job for between 11-30 years, while 103 (25.1%) who had good safety practices had spent more than 30 years as drivers. Only 59 (14.4%) of those who had within 10 years' experience had good safety practices. The difference in safety practices and years of experience on the job was not statistically significant $p = 0.680$. Possession and validity of driver's license have no statistical significant relationship with practice of safety measures among respondents $p = 0.949, 0.679$ respectively. Of all respondents with driver's license, 297 (75.6%) had good safety practices and did test before licensed. There was statistical significant relationship between practice of safety measures and subjected to driving test before issuance of license $p = 0.001$.

As shown in Table V, many respondents 262 (63.9%) who had good safety practices had no history of RTC compared with 110 (26.8%) who had RTC. The difference in the level of safety practices and ever had RTC was not statistically significant $p = 0.938$. The number of RTC, severity of injury sustained and the last time respondents had RTC

Tab. I. Socio-demographic variables of respondents (n = 410).

Socio-demographic variables	Frequency	Percent (%)
Age group (years)		
≤ 25	16	3.9
26-35	62	15.1
36-45	131	32.0
46-55	109	26.6
56 -65	74	18.0
> 65	18	4.4
Mean ± SD	46.78 ± 11.27	
Median (IQR)	45.00 (40.00-55.00)	
Range	22-73	
Sex		
Male	409	99.8
Female	1	0.2
Religion		
Islam	370	90.3
Christianity	39	9.5
Others	1	0.2
Ethnicity		
Yoruba	387	94.4
Hausa	8	2.0
Igbo	6	1.5
Others	9	2.1
Educational level		
None	123	30.0
Primary	166	40.5
Secondary	103	25.1
Tertiary	18	4.4
Marital status		
Single	13	3.2
Married	388	94.6
Widowed	9	2.2

SD: standard deviation; IQR: inter-quartile range.

had no significant relationship with safety practices while driving $p = 0.506, 0.881, 0.902$ respectively.

The respondents that tested positive for alcohol were 29 (7.1%), while 381 (92.9%) were negative. The mean level of blood alcohol concentration was $23.28 \pm 23.32 \mu\text{g/dl}$ (Tab. VI).

Tab. II. Safety measures practiced by the respondents while driving (n = 410).

	Always	Sometimes	No
Safety measures	n (%)	n (%)	n (%)
Obey speed limit	339 (82.7)	23 (5.6)	48 (11.7)
Obey traffic lights	363 (88.5)	10 (2.4)	37 (9.0)
Observe road signs	367 (89.5)	5 (1.2)	38 (9.3)
Use seat belt	351 (85.6)	12 (2.9)	47 (11.5)
Rest when fatigued/ stressed during driving	355 (86.6)	13 (3.2)	42 (10.2)
Maintain vehicle in good condition	368 (89.8)	2 (0.5)	40 (9.8)
Avoiding alcohol and drugs (kolanut, tobacco, caffeine etc.) while driving	361 (88.0)	4 (1.0)	45 (11.0)

Discussion

The mean age of the respondents in this study was 46.78 ± 11.27 years. This reflected that active population group are involved in commercial driving. Although the age range from 22 to 74 years, this showed the wide spectrum of individuals involved in transportation at early stage of life and continue till older age. On literacy level, a quarter 25.1% of the respondents attended secondary school. Many of the respondents either had primary (40.5%) or no formal education (30.0%). Driving work does not require advance education, therefore, it was not a surprise that three-quarters either had primary or no formal education. In fact, it is because of challenges of job opportunities in Nigeria that probably made the 4.4% of those with tertiary education to be engaged in driving work.

About one-third of the respondents (30.0%) were in driving business for 10 to 20 years and 26.1% had spent between 21 and 30 years on the job. These findings were consistent with age distribution of the respondents because most drivers start learning the art of driving between 15 and 20 years of age. This implied that major motor parks in the State were saturated with experienced and mature drivers where it is expected that compliance to safety rules and regulations will be given high priority. Although, 95.9% had drivers' license, only 75.1% of respondents had valid license. This is far from expectation as these were professional drivers whose only occupation is driving yet possession of license is sub-optimal. It clearly showed that there were gaps in monitoring and enforcement of laws if one in every four commercial drivers has no valid license.

About a third (29.5%) of the respondents had experienced road traffic crashes in the past. Of those who had experienced RTC, 78.5% had one RTC, while 21.5% had two or more RTC. This reflected the magnitude of road crashes in Nigeria. This implied that concerted efforts are required by all stakeholders to address the challenges in road safety and reduce road traffic crashes. In addition, data generation and management should be supported as there may be under reporting of road traffic crashes. Almost two-thirds, 63.6% of respondents that were involved in road crashes reported that the crash occurred in the day time and 36.4%

Tab. III. Safety check conducted on the vehicles by respondents before embarking on journey (n = 410).

Safety check of vehicle	Always	Sometimes	No
	n (%)	n (%)	n (%)
Water level in the radiator	371 (90.5)	1 (0.2)	38 (9.3)
Oil level	371 (90.5)	1 (0.2)	38 (9.3)
Tyre pressure	370 (90.2)	3 (0.7)	37 (9.0)
Lighting system such as headlamps	371 (90.5)	1 (0.2)	38 (9.8)
Brake and clutches	372 (90.7)	1 (0.2)	37 (9.0)
Wipers	369 (90.0)	3 (0.7)	38 (9.3)
Horns	370 (90.2)	2 (0.5)	38 (9.3)
Gauge tyre before travelling	371 (90.5)	2 (0.5)	37 (9.0)
Battery	372 (90.7)	2 (0.5)	36 (8.8)

Tab. IV. Relationship between practice of safety measures and driving experience of the respondents.

Variable	Practice of safety measures			χ^2	P value
	Good n (%)	Poor n (%)	Total n (%)		
Duration driving (years)					
≤ 10	59 (14.4)	5 (1.2)	64 (15.6)	0.769	0.680
11-30	210 (51.2)	20 (4.9)	230 (56.1)		
> 30	103 (25.1)	13 (3.2)	116 (28.3)		
Possession of driver's license					
Yes	356 (86.8)	37 (9.0)	393 (95.9)	0.004 ^Y	0.949
No	16 (3.9)	1 (0.2)	17 (4.1)		
Valid driver's license (n = 385)					
Yes	263 (68.3)	26 (6.8)	289 (75.1)	0.171 ^Y	0.679
No	86 (22.3)	10 (2.6)	96 (24.9)		
Did driving test before given the license (n = 393)					
Yes	297 (75.6)	23 (5.9)	320 (81.4)	10.021	0.001
No	59 (15.1)	14 (3.6)	73 (18.6)		

χ^2 : Chi square; *: p value < 0.05; ^Y: Yates corrected.

Tab. V. Relationship between practice of safety measures and involvement in road traffic crash by the respondents.

Variable	Practice of safety measures			χ^2	P value
	Good n (%)	Poor n (%)	Total n (%)		
Ever had RTC as a driver					
Yes	110 (26.8)	11 (2.7)	121 (29.5)	0.006	0.938
No	262 (63.9)	27 (6.6)	289 (70.5)		
Number of RTC had (n = 121)					
1	85 (70.3)	10 (8.3)	95 (78.5)	0.442 ^Y	0.506
≥ 2	25 (20.7)	1 (0.8)	26 (21.5)		
Severity of RTC (n = 121)					
No injury	78 (64.5)	7 (5.8)	85 (70.3)	0.252 ^Y	0.881
Mild to serious injury	26 (21.5)	4 (3.3)	30 (24.8)		
Fatal	6 (4.9)	0 (0.0)	6 (4.9)		
Last time RTC occurred (years) (n = 121)					
< 1	16 (13.2)	2 (1.7)	18 (14.9)	0.015 ^Y	0.902
≥ 1	94 (77.7)	9 (7.4)	103 (85.1)		

χ^2 : Chi square; *: p value < 0.05; ^Y: Yates corrected.

persons reported that it occurred at night. The occurrence of crash in the night reported in this study is similar to a study conducted in India where 44.16% of crashes occur in the evening hours [7]. However, less than 10% of those who travelled by road were involved in night travel. This implied that travel activity of less than 10% accounted for more than a third of the crashes. Therefore, if night travel is averted, a third of road crashed will be

prevented. Additionally, rescue operations and provision of assistance and support services to victims of road crashes are often limited during the night hours.

On the severity of the RTC, 24.8% reported mild to severe injuries were sustained in this study. It has been reported that in many low-income and middle-income countries, the burden of traffic-related injuries is such that they represent between 30% and 86% of all trauma admissions, millions of others sustain injuries, with some suffering permanent disabilities. Enormous human potential were being destroyed, with serious social and economic consequences [1, 5]. Among those involved in crashes, 14.9% had the last RTC in less than a year while 8.3% had the last RTC in 1-2 years ago. This showed that road crashes is a frequent problem and concerted efforts are required by all relevant stakeholders to combat the menace.

Majority of the respondents practiced safety measures which include obeying speed limit 82.7%, obeying traffic light 88.5%, observing road signs 89.5%, using belts 85.6%, resting when fatigued 86.6%, maintaining the vehicle in good condition 89.8% and not ingesting alcohol while

Tab. VI. Blood alcohol concentration of intercity commercial vehicle drivers just before embarking on a journey (n = 410).

Variable	Frequency	Percent
Alcohol test		
Positive	29	7.1
Negative	381	92.9
Blood alcohol concentration (n = 29)		
Range (min-max)	3-105	
Median (inter-quartile range)	14.00 (7.00-34.00)	
Mean ± SD	23.28 ± 23.32	

driving 361 (88.0%). The respondents demonstrated good safety practices in many aspect of driving. This showed that they are experienced drivers and put knowledge garnered over the years to use. Regular and continuous maintenance of vehicle is fundamental to avert road crashes. Concerning safety checks of the vehicles, majority of the respondents checked water level in radiator 90.5%, check lighting system 90.5%, check brakes and clutches 90.7%, check horns and spare tyre 90.2%, have fire extinguishers 87.3% and did wheel alignment and balancing 89.8%. This demonstrated that respondents gave safety practice the necessary priority. One in every ten respondents 9.3% did not have driver's license, and of those who had it, 83.8% possess valid licenses. Monitoring of drivers by regulatory agencies is required because lack of valid license has serious implications on legality of driving. More respondents, 68.3% in the age group 26-55 years had good safety practices compared with those ≤ 25 years 3.2% and > 55 years 19.3%. However, the observed difference was not statistically significant $p = 0.057$. Literacy level of the respondents had no statistical significant relationship with practice of safety measures $p = 0.373$.

Of all respondents with driver's license, three-quarters (75.6%) had good safety practices and carried out driving test before issuance of license. There was statistical significant relationship between those that practiced safety measures and those who carried out driving test before issuance of license $p = 0.001$. It is obvious that those who carried out driving test were more likely to conform to standard practice. Many respondents 63.9% who had good safety practices had no history of RTC compared with 26.8% who had RTC. The difference in the level of safety practices and ever had RTC was however, not statistically significant $p = 0.938$. Though not statistically significant, it showed good safety practice may reduce road crashes. The respondents that tested positive for alcohol were 7.1%, and the mean level of blood alcohol concentration was $23.28 \pm 23.32 \mu\text{g/dl}$. Alcohol has strong association with RTC and this may be one of the major factors responsible for increasing road crashes in Nigeria. This implied that monitoring of commercial drivers is required to enhance road safety. This will provide the basis of strategic interventions and will reduce alcohol consumption while driving as many commuters are in danger with drunk driver.

Conclusions

Majority of inter-city commercial drivers demonstrated good safety practices in many domains. More respondents who practiced safety measures carried out driving test before issuance of license compared with those who did

not ($p = 0.001$). Some respondents tested positive for alcohol and the mean blood alcohol concentration was $23.28 \pm 23.32 \mu\text{g/dl}$. About a third of the respondents had experienced road traffic crashes in the past. Night travel was responsible for more than a third of road traffic crashes but less than 10% travelled during this period. It is recommended that restriction of night travel, continuous orientation of the drivers and enforcement of relevant laws are critical to addressing the challenges of road safety in Nigeria while supporting research and development for informed decisions.

Acknowledgements

The support of Professor G. K. Osagbemi of Department of Epidemiology and Community Health, University of Ilorin, Nigeria is acknowledged in this study.

Conflict of interest statement

None declared.

Authors' contributions

AGS-Conceptualization, data collection and analysis; manuscript preparation. KAD - Data collection, analysis, manuscript preparation and editing. ASY - Data collection and manuscript preparation. MFA - Data collection.

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■ Received on July 1, 2018. Accepted on February 7, 2019.

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