http://www.ejournalofscience.org

Understanding of Traffic Signs by Drivers – A Case of Akure City, Ondo State, Nigeria

[1] Makinde, Opeyemi Oluyemisi, [2] Opeyemi, David A
[1, 2] Rufus Giwa Polytechnic, Owo
[1] yemikanye@yahoo.com, [2] da_opeyemi@yahoo.com

ABSTRACT

Traffic signs as a Traffic Control Device for traffic safety aims to regulate and control traffic by providing information about the road and its environment for road users. This study investigated the understanding of traffic signs by drivers in the city of Akure with respect to their personal characteristics such as age, marital status, gender, and educational background. A total of 20 symbolic warning and regulatory-prohibitory signs were investigated. 200questionnaires were prepared and distributed within the various motor parks in Akure, 185 of the questionnaires were returned. The analysis showed that there is a low understanding of traffic signs by drivers. The average percentages of drivers who correctly understood the warning and prohibitory signs were 67 and 58%, respectively. Age, Education and years of driving experience played prominent roles in drivers' understanding of signs, however marital status and gender had no effect.

Keywords: *Understanding, Traffic signs, Drivers Characteristics, Traffic Safety*

1. INTRODUCTION

The number and quantity of vehicles on roads has increased due to technological and economical development in recent years [1]. As a result of this increase, traffic has been one of the most important parts of our daily lives as people spend more time in traffic thereby forcing drivers and other road users to face a higher risk of traffic accident. Worldwide more than 1.25 million people lose their lives annually due to traffic crashes. Everyday nearly 1,049 people under the age of 25 lose their lives in traffic accidents [2].

Traffic signs are the oldest and most commonly used traffic control device (TCD). These signs convey messages in words or symbols and erected to regulate, warn, or guide the road users (motorists, and pedestrians etc). Traffic signs are commonly used traffic safety tools, mainly developed to provide crucial information in a short time to support safe drive; but the success depends on their comprehensibility by the drivers [3]. Traffic signs, however are most effective when they command attention, convey a clear and simple meaning, command respect of the road users and give adequate time for proper response [4]. Traffic signs use color, shape, and words to convey information. However, the traffic signs cannot effectively serve their intended purpose if drivers do not understand the information concerning safe driving behavior that is encoded in the sign [5].

The American National Standard Institute (ANSI Z535.3) advice that traffic signs should meet 85%, while the Organization of International Standardization (ISO 3864) pegged its own at 67% [6]. Traffic signs in relation with congestion and road accident occurrences have been a topic of considerable interest to researchers in the past few decades. There is a general perception that drivers in Akure do not have a satisfactory level of understanding of traffic signs and often, this is thought to be a major cause of road

accidents. Consequently, this research was undertaken to access the drivers' personal characteristics in understanding of traffic signs in Akure, the capital city of Ondo state.

The major aim of the project is to know the individual characteristic of drivers in understanding traffic signs. The study of the role of drivers' characteristics in understanding traffic signs in Akure is of great importance since the rate of accident occurrences along the expressway is at an alarming rate.

Akure is a city in the south-western region of Nigeria with coordinates: 7°15'0"N, 5°11'42"E. The city has a population of approximately 387,087. The people are of the Yoruba tribe. Akure is surrounded by extensive tracts of tropical forest reserves and supports a large timber industry. Akure is connected by road to other Nigerian cities such as Lagos and Ibadan. It also has an airport. It's the site of Federal University of Technology Akure (founded in 1981). Akure is the tourist destination and departure point for visitors to the nearby Osse River.

Fig 1: Map of Akure

2. LITERATURE REVIEW

With traffic volume increasing over the last eight decades, many countries have adopted pictorial signs or otherwise simplified and standardize their signs to facilitate international travels where language difference could create barriers, and in general to help enhance traffic safety. Such pictorial signs use symbols in place of words and are usually based on international protocol. Such signs were first developed in Europe, and have been adopted by most countries.

The manual on uniform traffic control devices (MUTCD) for streets and highways [7] provide the basic principles for the design and use of signs, signals and pavement markings for all public roadways in the United States. Several countries in the world have also developed their own traffic control device manuals which are very much similar to the MUTCD in the USA. Another study [8] identified seventeen MUTCD standards as having a significant need for additional research, it was concluded that many control signs and warrants are likely to benefit from further evaluation, improved design, or better understanding of drivers' capabilities and behaviors. One of the more extensive studies of drivers' understanding of TCDs was conducted for the American Automobiles' Association (AAA) by [9]. Driver's comprehension of several traffic signs and pavement markings were assessed by [9]. In a sample of over 3100 drivers, from across the United States, comprehension levels reported by [9] was generally poor with overall percentage of correct responses of signs being 74%. They also found out that old drivers were more likely to misunderstand certain traffic signs more than younger drivers.

The 1995 Kansas study [5] evaluated 43 traffic devices in terms of drivers understanding of the meaning of the information encoded in the signs and pavement markings. Both multiple choice questionnaire and open encoded questionnaire and pavement markings that were misunderstood by the Kansas drivers and proposed some general recommendation for improving drivers understanding of certain traffic signs.

Another researcher [10] investigated the influence of drivers' comprehension of signs on accidents involvement, citation received and seat belt usage. While knowledge of signs was increasing with seat belt usage, no significant association with accident involvement was observed: even when age was incorporated with the accidents. Similarly, no significant difference with no of citation received was observed. Furthermore, those with no speed citations or low number of speed citations were not significantly better than those with high number of speed citations.

A research carried out by [11,12] examined the influence of drivers' accident involvement and personal characteristic on their understanding of 28 traffic regulatory and warning signs. A sample of 9000 drivers who were residents of Bahrain, Kuwait, Oman, Qatar, and United Arab Emirates was used. Result showed that on average, drivers really understood 56% of all signs. The gulf states, Asian and Arab drivers understood the signs less well and were not much helped by the use of the pictograms rather than written instructions, male drivers score higher than female drivers, age, marital status experience and accident rates had no obvious bearing on comprehension of signs. The overall conclusion was that personal characteristics, rather than accident involvement rates, are most clearly associated with comprehension capabilities.

3. METHODOLOGY

The method used in this research involved the use of questionnaires administered and completed by inter-city commercial drivers. The intra-city commercial drivers were not considered because it was observed that traffic signs are not readily common and visible within Akure city, hence, only the inter-city commercial drivers were given the questionnaires. Two hundred questionnaires were distributed amongst drivers in various inter-city motor parks in Akure viz-a-viz Akure-Benin park, Akure-Ondo park, Akure-Lagos park, Akure-Owo park, Akure-Idanre park, Akure-Igbara park. The questionnaire used was made up of three sections with the first section made up of short answers questions while the second and third sections were made up of multiple choice questions.

The first section was designed to give detailed information about the drivers personal and socio-economic characteristics such as the age, sex, and educational background etc, the second section gave information about the drivers' characteristics such as driving as a job, driving experience etc while the third section assessed the understanding of traffic signs by the drivers. The third sections had 20 multiple choice questions of different traffic signs made up of ten warning signs and ten regulatory-prohibitory signs.

4. RESULTS AND DISCUSSION

The total number of questionnaire administered in all the selected parks were two hundred but only 185 were returned which signifies a response rate of 92.5%.

4.1 Characteristics of Drivers

Table 1 below summarizes the personal characteristics of the 185 drivers; all were male with no females. Even though there is no restriction on female driving vehicles, seldom can one see a female driving a commercial vehicle within and outside the city of Akure. The age distribution showed that the drivers were mostly young. 15.7% were between (20-25) years, 18.9% were between (26-30) years, 22.2% were between (31-35)

years, and 35.1% were between (36-40) years, with only 8.1% between 41 years and above.

The marital status of the drivers shows that most of the drivers are married. 64.8% of the respondents are married, 33% are single, with only 2.2% divorced. The educational background of the drivers shows that 59.5% of the drivers have WAEC certificate, 23.8% of them with NCE/OND certificate, 14.1% of the drivers possesses HND certificate and 2.7% with B.SC certificate.

Table 1: Personal Characteristics Of Drivers

	CHARACTERISTICS	SAMPLE NO	PERCENTAGE (%)
Gender	Male	185	100
	Female	0	0
Age (years)	20-25	29	15.7
	26-30	35	18.9
	31-35	41	22.2
	36-40	65	35.1
	41 and above	15	8.1
Marital status	Single	61	33.0
	Married	120	64.8
	Divorced	4	2.2
Educational Background	WAEC	110	59.5
	NCE/OND	44	23.8
	HND	26	14.1
	B.Sc	5	2.7

4.2 Driving Characteristics of Drivers

Table 2 represents the driving characteristics of the drivers; the result shows that 73% of the drivers drive between (4-7) days per week, 24.3% drive between (2-3) days per week, and only 2.7% drive in a day per week. Approximately 94.1% of the drivers drive for job with only 5.9% not driving for job. 100% of the drivers sees and obeys traffic signs along the road. Similarly, 53% of the drivers had driving experience of 6-10years, 29.2% had a driving experience below 5years and 17.8% has a driving experience of 10 years and above.

Table 2: Driving Characteristics of Drivers

	CHARACTERISTICS	SAMPLE NO	PERCENTAGE (%)
Drive For Job	Yes	174	94.1
	No	11	5.9
See traffic sign along the road	Yes	185	100
	No	0	0
Do you obey traffic signs	Yes	185	100
	No	0	0
Driving Years(yrs)	1-5	54	29.2
	6-10	98	53.0
	10 and above	33	17.8
Driving days per week (days)	1	5	2.7
	2-3	45	24.3
	4-7	135	73.0

4.3 Drivers Understanding Of Traffic Signs (Warning & Regulatory - Prohibitory Signs)

Table 3 shows the result of drivers' understanding of warning signs. A total of 10 warning signs were evaluated in this study. The average percentage of correct answers of these signs was 67%, which indicated that the understanding was very poor. The signs that were understood well by drivers were "Narrow Bridge Ahead 80%, Roundabout 81%, School Children Crossing 75% and T-Junction 74%". These high percentages could be attributed to the self explanatory graphics in the signs. The least understood traffic sign is "Dangerous Double Bend 48%.

Table 3: Drivers Understanding of Warning Signs

SIGN	MEANING	PERCENTAGE (%)
	Y – Junction	58
	Dangerous Double Bend (First to Left)	48
	Narrow Bridge Ahead	80
	Give Way to traffic	62
	Cross Road or Four-Way Junction	68
	T – Junction	74
	Dangerous Bend Right	58
	Roundabout	81
	Long Grade Dangerous Hill	69
	School Children Crossing	75

a. Mandatory Signs

A total of 10 mandatory signs were evaluated in the study. The results of drivers' understanding of the signs are presented in table 4. The average percentage of correct answers was 58%, which indicated that the understanding was very poor. The signs that were understood well by drivers were "No Parking 92%, No U-Turn 76%, Speed limit 71% and Stop at Intersection 71%". These high percentages of correct answers can be attributed to the self explanatory graphics in this mandatory signs.

Table 4: Drivers Understanding Of Regulatory (Prohibitory) Signs

SIGNS	MEANING	PERCENTAGE (%)
	No Right Turn	47
	No Parking	92
	No Left Turn	49
	No U-Turn	76
	Stop at intersection	71
	No Overtaking	42
	Speed Limit	71
	No Horn	46
	No Waiting	42
	No Stopping	45

Drivers' responses were further analyzed to see if their personal and driving characteristics have any effect on their responses. Only the educational background, age and years of experience of the drivers had influenced the responses. The drivers with B.Sc and Higher National Diploma (HND) understood traffic signs more than the drivers with WAEC and OND.

Similarly, the drivers with age range of 26-30 and 30- 35 do have a better understanding of traffic signs more than the younger ones. The drivers with driving experience of 6-10years and 10years & above do comprehend traffic signs easily and better than those with 1-5years experience.

5. CONCLUSION AND RECOMMENDATIONS

The understanding of traffic signs by drivers is an important factor in order to enhance maximum safety on the roads. Road signs as a means of communication are used in providing necessary information about the road and its environment to road users especially the drivers. The result of the study shows that generally, drivers have a poor understanding of traffic signs. This could be attributed to the educational background of drivers since majority of the drivers (83%) had either WAEC or OND. The result also showed that the older drivers (above 41years) and the younger drivers (below 20years) understand traffic signs less than the average aged drivers.

From the study, education had a significant effect on the understanding of traffic signs as observed in the result. In general, gender had no effect on the understanding of traffic signs since there was no female driver as an inter-city driver. The findings agree with other research work that drivers generally have problems in understanding traffic signs.

The results of the study showed that more efforts should be given to the drivers to increase their understanding of traffic signs. This is achievable by the proper use of educational materials such as handbook, posters, campaign, use of public media like radio and television, seminars and talk shows. Government organizations such as Federal Road Safety Corps (FRSC), Nigeria Police -Motor and Traffic Division (NP-MTD) should be well and adequately equipped to deliver and help drivers with all the educational materials mentioned above.

REFERENCES

[1] Kirmizioglu, E (2010): Analysis of Comprehension of Traffic Signs: A Pilot Study in Ankara, Turkey. A M.Sc Thesis Submitted to the Graduate School of Natural and Applied Sciences, Civil Engineering, transportation Department, Middle East Technical University, Ankara, Turkey.

[2] World Health Organization. (2004): World Report on Road Traffic Injury Prevention. Geneva: WHO Library Cataloguing.

[3] Kirmizioglu, E and Tuydes-Yaman, H (2012): Comprehensibility of Traffic Signs among Urban Drivers in Turkey, Accident Analysis and Prevention 45 (2012) 131– 141.

[4] Canfield, R. R (1999): Traffic Signs and Markings. In: Pline, J. (Ed.), Traffic Engineering Handbook, 5th Edition. Institute of Transportation Engineers, Washington DC, pp 411-452.

[5] Stokes, R. W., Rys, M. J., Russell, E. R. and Kerbs, J. (1995): Motorist Understanding of Traffic Control Devices in Kansas, Final Report No. KSU-94-7, Department of Civil Engineering, Kansas State University, Manhattan, KS.

[6] Wolff, J.S. and Wogalter, M. S. (1998): Comprehension of Pictorial Symbols: Effect of Context and Test Method, Human Factors, (40), 173–186.

[7] Federal Highway Administration (FHA), (2000): Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), Washington D.C.

[8] Shapiro, P. S., Upchurch, J. E., Loewen, J. and Siaurusaitis, V. (1987): Identification of Needed Traffic Control Device Research, Journal of Transportation Research Board (TRR 1114): 11-20.

[9] Hulbert, S., Beers, J. and Flower, P. (1979): Motorist's Understanding of Traffic Control Devices, American Automobile Association (AAA), Foundation for Traffic Safety, Falls Church, VA.

[10] Al-Madani, H. (2000): Influence of Driver's Comprehension of Posted Signs on Their Safety Related Characteristics, Accident Analysis and Prevention (32): 575–581.

[11] Al-Madani, H. and Al-Janahi, A. R. (2002): Assessment of Drivers' Comprehension of Traffic Signs Based On Their Traffic, Personal and Social Characteristics, Transportation Research Part F, (5): 63-76.

[12] Al-Madani, H. and Al-Janahi, A. R. (2002): Role of Drivers' Personal Characteristics In Understanding Traffic Sign Symbols, Accident Analysis and Prevention (34): 185-196.