

Survey on visual acuity among intra-city commercial vehicle drivers in Ibadan, southwestern Nigeria

Magbagbeola David Dairo, Ugochukwu Patricia Okechukwu-Nwankpa, Romanus Nwankpa

Department of Epidemiology and Medical Statistics, College of Medicine, University of Ibadan, Nigeria

Abstract

Driving is recognized to be a visually intensive task and accordingly legal minimum standard of vision required for all motorists is stipulated. This study was carried out to find out how many commercial drivers in Ibadan North L.G.A met minimum legal requirement for driving in Nigeria. A cross sectional descriptive study was conducted among 340 commercial vehicle drivers selected by multistage sampling from eight transport stations (motor parks) in the city. Visual impairment was defined as vision acuity (VA) in both eyes which is below 3/18 but above 3/60 (VA <6/18≥3/60) and was assessed with the Snellen's chart. All participants have valid driving licenses. One sixth [52, (15.3%)] have visual acuity below 6/9 and 18 (5.3%) have visual impairment (VA <6/18≥3/60). More of those drivers aged 40 years and more had visual impairment compared to the younger drivers (P<0.05). These findings suggest that regulatory standards for licensing drivers are being circumvented by some of the drivers. Mechanisms for ensuring compliance to the regulatory standards especially visual acuity is therefore recommended.

Introduction

According to the new global estimates by the World Health Organization, there are approximately 314 million people around the world whose vision is impaired, due to either eye diseases or uncorrected refractive errors.¹ Of this number, 45 million people are blind and more than 90% of the world's visually impaired people live in developing countries. Africa experiences a significantly higher burden of blindness and vision impairment than other regions. While Africa has only 11 per cent of the world's population, it is home to approximately 19 per cent of the world's blind population.² Uncorrected refractive errors, which

affect persons of all ages and ethnic groups, are the main cause of visual impairment.³

Driving, a very important practice worldwide is necessary for various purposes which include work, social life, pleasure and entertainment among others. It facilitates the performance of routine daily activities and is thus an integral part of the concept of quality of life.⁴ Driving is the primary mode of travel in many countries and vision is a fundamental component of safe driving.⁵ Good distance vision, near vision focusing, peripheral vision, color vision, contrast sensitivity, depth perception, are all essential in safety driving.

Every year, according to the statistics, 1.2 million people are known to die in road accidents worldwide. Millions of others sustain injuries, with some suffering permanent disabilities. No country is spared this toll in lives and suffering, which strikes the young particularly. Enormous human potential is being destroyed, with grave social and economic consequences. Road safety is thus a major public health issue throughout the world and poor road user eyesight is one of the risk factors influencing crash involvement.¹ Annually, an average of 10,000 Nigerians are killed while another 25,000 are injured from road traffic accidents (RTAs).⁶ Given these statistics, it is hard to ignore the role of vision that is responsible for 95% of driving-related information inputs.⁷ Therefore ascertaining good vision for commercial vehicle drivers among other things (physical, mental well-being) could help in ensuring the safety of drivers and passengers as well as other road users thereby preventing road traffic accident. To see and be seen is a fundamental prerequisite for the safety of all road users. In highly-motorized countries, inadequate visibility plays a key role in the three types of crashes.⁸ Most low-income and middle-income countries do not have many roads and most of their roads are bad with pot holes and inadequate illumination; some are not lit at all making it difficult to see the pot holes or bad places on the road especially at night. Poor drivers' eyesight will most of the time make the situation worst. A driver's visual acuity must at least be such that he or she has time to read, understand and act on standard traffic control signs while moving at the maximum posted speed, not only in daylight but also in darkness.⁹

Visual acuity is one of the parameters of visual function which is commonly measured. It measures the clearness of vision. In most countries the standard threshold for visual acuity is 20/40 (0.5, 6/12) and is also accepted as standard requirement for driving with visual acuity of 20/40 (0.5, 6/12) in the better eye. We believe this to be reason-

Correspondence: Magbagbeola David Dairo, Department of Epidemiology and Medical Statistics, College of Medicine, University of Ibadan, Nigeria.

Tel.: +234.8035664708.

E-mail: drddairo@yahoo.com

Key words: Visual acuity, commercial vehicle drivers, periodic screening.

Acknowledgements: The authors wish to acknowledge all the chairman of the National Union of Road Transport Workers in Ibadan, and all the members of the union in the respective garages in which the study was carried out.

Contributions: MDD and UPON conceived and designed the study. UPON did the literature review. UPON and RON collected and analyzed the data. MDD and UPON drafted the article. All authors read the draft manuscript and agreed on the content before publication

Conflict of interest: the authors declare no potential conflict of interest.

Funding: none.

Received for publication: 27 September 2017. Revision received: 19 February 2018.

Accepted for publication: 20 February 2019.

This work is licensed under a Creative Commons Attribution NonCommercial 4.0 License (CC BY-NC 4.0).

©Copyright M.D. Dairo et al., 2019

Licensee PAGEPress, Italy

Journal of Public Health in Africa 2019; 10:789
doi:10.4081/jphia.2019.789

able, not because one becomes an unsafe driver at 20/50 (0.4, 6/15) but because it includes a safety margin for adverse conditions. This criterion implies that subjects who can read 20/40 on a well-lighted, stationary chart, are generally assumed to still be safe drivers in a moving environment and under adverse conditions, such as after dark, in rain or in fog. There appears to be a widespread consensus that this provides an adequate safety margin between visual acuity measured in the office and driving safety as practiced on the road.¹⁰ Visual acuity is measured differently across countries. The visual acuity is measured in North America inside the driving license office and the Snellen's chart is used. However, in the United Kingdom drivers are asked to read a number plate for visual acuity.¹¹

Driving is recognized to be a visually intensive task and accordingly there is a legal minimum standard of vision required for all motorists.¹² A majority of countries

assess at least visual acuity and visual fields as part of their initial assessment of vision, prior to issuing a first driving license. This is believed to be a best practice when assessing drivers' vision, as it underlines the importance of always driving with good vision. Since vision changes with age, countries should require a further assessment of vision by a competent professional before the periodic renewal of a driver's license. Public policy on making sure that driver's vision is tested before driver's license is issued and renewed is to identify those with visual impairment and to restrict them from driving by withholding their driver's license when necessary, hence, there is a minimum legal requirement for visual acuity before a driver's license can be issued in Nigeria.¹³

In Nigeria the minimum visual acuity requirement for driving as set by Federal Road Safety Commission (FRSC), which is to be tested at a distance of 6m is 6/9 in the better eye and 6/24 in the second eye for commercial drivers.¹³ This is the same as that of Ghana where a visual acuity of 6/9 is specified as the criterion for driving as indicated on the Drivers and Vehicle Licensing Authority (DVLA) form.¹⁴ Since vision a critical source of information for judgment while driving, visual assessment for driving is therefore a major public health issue. This study was carried out to find out how many commercial drivers in Ibadan North L.G.A met minimum legal requirement for driving in Nigeria

Materials and Methods

Study design, sampling and data collection

This is a cross-sectional descriptive study. A multistage sampling method was used. Ibadan North Local Government was selected by balloting out of five (Ibadan North, Ibadan North East, Ibadan North West, Ibadan South East, Ibadan South West) urban local governments in Ibadan Metropolitan Area of Oyo State. From the list of eight (Mokola, Bodija, Sango-Gate, Oje, Gate, Iyana-Adeoyo, University College Hospital, University of Ibadan) homogenous (cluster) motor parks in Ibadan North L.G.A, four motor parks (Mokola, Bodija, Gate, Oje) were selected by balloting without replacement. Cluster sampling of all the commercial vehicle drivers in each of the selected four motor parks was then done to collect the necessary information. An interviewer administered semi-structured questionnaire was used by trained assistants to collect information from consenting current drivers until the

required sample size of 340 commercial vehicle drivers is complete. The Questionnaire was translated into the local language (Yoruba) for easy administration and also translated back to English to ensure accuracy of translation. Information were collected on socio-demographic characteristics and driving history.

Visual assessment was done using the Snellen chart and Illiterate E chart. The Visual Acuity (V.A) test done included the monocular (left eye or right eye) and binocular (both eyes) tests and was conducted in broad daylight by a trained optometrist.

Data analysis

The data was entered daily after collec-

tion. Data collected on the questionnaire was analyzed using Statistical Package for Social Science (SPSS) version 21 software. Frequency counts and percentages were generated age of the drivers, presenting monocular (left or right) vision, presenting binocular vision. Chi-square tests were carried out to explore the association between Age and presenting binocular vision.

Ethical considerations

Ethical Approval for this study was obtained from Ministry of Health, Oyo State. Also, verbal approval was given by the chairman of the commercial vehicle drivers in Ibadan North L.G.A. Informed consent was obtained from each participant.

Table 1. Age group of the respondents (total = 340).

Demographic variables	Frequency, n (%)
Age group (in years)	
20-29	5 (1.5)
30-39	32 (9.4)
40-49	90 (26.5)
50-59	114 (33.5)
60-69	91 (26.8)
70-79	8 (2.4)
Validity of driver's license	
Currently valid	340 (100)
Invalid	0 (0)
Awareness of personal visual defect	
Yes	340 (100)
No	0 (0)
Use of corrective lenses	
Yes	340 (100)
No	0 (0)

Table 2. Patterns of Presenting Vision (total = 340).

Visual Acuity	Right eye	Left eye	Both eyes
≥6/9	248 (72.9)	250 (73.5)	288 (84.7)
<6/9 ≥6/12	32 (9.4)	29 (8.5)	21 (6.2)
<6/12 ≥6/18	25 (7.4)	26 (7.6)	13 (3.8)
<6/18 ≥3/60	30 (8.8)	34 (10.0)	18 (5.3)
<3/60-NLP	5 (1.5)	1 (0.3)	

Table 3. Association between age and presenting binocular vision.

Age group	≥6/9	<6/9 ≥6/12	<6/12 ≥6/18	<6/18 ≥6/36	Total
20-29	5 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (100.0)
30-39	32 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	32 (100.0)
40-49	87 (96.7)	0 (0.0)	1 (1.1)	2 (2.2)	90 (100.0)
50-59	94 (82.5)	11 (9.6)	4 (3.5)	5 (4.4)	114 (100.0)
60-69	64 (70.3)	10 (11.0)	8 (8.8)	9 (9.9)	91 (100.0)
70-79	6 (75.0)	0 (0.0)	0 (0.0)	2 (25.0)	8 (100.0)
Total	288 (84.7)	21 (6.2)	13 (3.8)	18 (5.3)	340 (100.0)

Pearson Chi-Square 41.490, df 15, Sig. (2-sided) 0.0001.

ing driver. Participation in this study was entirely voluntary. Data collected was stripped of identifying information to ensure anonymity. Drivers with suboptimal vision was referred for ophthalmological assessment and management at the University College Hospital Ibadan, Oyo State, Nigeria.

Results

There were a total sample of 340 drivers in this study. The mean age is 52.5 ± 10.0 , their age ranges from 24 years to 72 years. The age group shows that greater percentage (33.5%) of drivers who participated in the study are between the ages of 50-59 while less than three percent (2.4%) is in the age group 70-79 (Table 1).

Respondents Presenting Vision Assessment showed that twenty seven percent (27.1%) has Visual Acuity below 6/9 in the right eye, out of which 10.3% has visual impairment. In the left eye about 26.9% has V.A below 6/9 out of which 10.3% has visual impairment. With both eyes 15.3% has V.A below 6/9 out of which 5.3% has visual impairment. Over eighty four percent (84.7%) has V.A $\geq 6/9$ in both eyes (Table 2). Binocularly visual impairment (V.A $< 6/18 \geq 6/36$) is found among those ≥ 40 years and it 5.3% compared to none in those below 40 years in this study. This association is statistically significant (P value < 0.05). It can be seen from this study that as these people increase in age, their likelihood of meeting legal requirement for driving decreases since their V.A decreases with increase in age (Table 3).

Discussion

There is universal agreement among researchers that vision plays a significant role in driving performance. Vision testing of all drivers, is therefore an important road safety issue.¹¹ This is very important because vision is responsible for 95% of driving-related information inputs.⁷ Also having known that more than 90% of the world's visually impaired people live in developing countries especially in Africa, it is very important that the commercial vehicle drivers in this part of the world is ascertained to have good vision.² This is imperative because commercial vehicle drivers are major road users and poor road user eyesight is one of the risk factors influencing crash involvement.^{1,2} It is on record that annually, an average of 10,000 Nigerians are killed while another 25,000 are injured from road traffic accidents

(RTAs).⁶ It becomes very important that drivers' visions are assessed to ensure that they meet minimum legal requirement for driving in Nigeria in order to ensure safety driving.

The results of this study showed that respondents in 340 samples are males, showing to a great extent that commercial vehicle driving is exclusively a male occupation in Nigeria. The age of the respondent ranges from 24 years to 72 years with the mean age of 52.5 ± 10.0 . There is a significant association ($P < 0.05$) between age and the vision of the drivers as was seen in this study. It was seen that older drivers ≥ 40 years have visual impairment (V.A $< 6/18$). Usually vision changes with increase in age. Most drivers do not in most cases notice this gradual and steady change in vision and as a result will not be aware that they fall below the required visual standard. There are age-related visual changes and so regular vision testing to assess the vision of all drivers more especially the older drivers is an important road safety issue.¹¹

Consistent with most studies, this study showed that about 52 drivers representing 15.3% of the respondents had presenting binocular vision $< 6/9$ which represents the proportion of the commercial drivers who do not meet the minimum legal requirement for driving in Nigeria and who are according to this requirement not to be given driving license except their V.A is corrected (though only five wore glasses as at the time of this study). This is comparable to the study done in Ghana by Ovenseri-Ogomo & Adofo,¹¹ where 12.1% of commercial drivers had a visual acuity $< 6/9$ which is below the visual acuity requirement for eligibility to drive in Ghana. The finding is also comparable to 11.5% of commercial inter-city vehicle drivers in Ilorin, Nigeria in which was found V.A $< 6/9$.^{11,15} Also McMoli and Ogunmekan in their study on road traffic accidents in Nigeria focusing on observation on controllable human factors in Lagos found 9.1% whose V.A $< 6/9$.¹⁶ McConnell, Spall and Hirst et al in their survey of the visual acuity of Brisbane drivers reported 8% reported for Australian drivers who did not meet the minimum legal requirement.¹⁷ These findings underscore the fact that some commercial drivers who did not meet the known criteria for eligibility to drive still obtain licenses to drive.

Conclusions

In conclusion, vision screening before issuance of driving license and its renewal should be enforced to ensure that only persons who met the minimum legal require-

ment for driving in Nigeria are given driving license. It is therefore expedient that government should encourage and empower the body responsible to enforce this law in other to do this judiciously.

Recommendation

Periodic screening of commercial drivers is recommended in the nation. Visual loss that may have occurred during the intervening period before renewal of driving licenses would be easily detected during periodic screening. Since the drivers are organized into driving units according to the routes they ply, then mobilizing them for periodic screening becomes very feasible.

References

1. World Health Organization. World report on road traffic injury prevention. Geneva: WHO; 2004.
2. Vision for Africa. A plan to eliminate avoidable blindness and vision impairment in sub-saharan Africa. The avoidable blindness snapshots. The African context. Vision for Africa, 2010.
3. World Health Organization. Vision 2020 (The Right to Sight). Global initiative for the elimination of avoidable blindness. Action Plan for 2006-2011. Meeting 11-13 July. Geneva. World Health Organization 2006.
4. Owsley C, McGwin G. Vision impairment and driving. *Surv Ophthalmol* 1991;43:535-50.
5. Bener A, Ahmad MF, El-Tawil MS, Al-Bakr S. Visual impairment and motor vehicle accidents. *Mid East J Emerg Med* 2004;4:1-9.
6. The Nigeria Police Force: Origin and Establishment. Management Services and Research Department. The Nigeria Force 1989;1-19.
7. Shinar D, Schieber F. Visual requirements for safety and mobility of older drivers. *Hum Factors* 1991;33:507-19.
8. Henderson RL. Motor vehicle conspicuity. Detroit, Michigan. Soc Automot Eng Tech Paper Series 1983;830566.
9. Charman WN. Vision and driving: a literature review and commentary. *Ophthalmic Physiol Opt* 1997;17:371-91.
10. Colenbrander A, De Laey JJ. Vision requirement for driving safety. International Council of Ophthalmology (ICO). Proceedings of the 30th World Ophthalmology Congress, Sao Paulo, Brazil, February 2006.

11. Subzwari S, Desapriya E, Babul-Wellar S, et al. Vision screening of older drivers for preventing road traffic injuries and fatalities. *Cochrane Datab System Rev* 2009;CD006252.
12. Kotecha A, Spratt A, Viswanathan A. Visual function and fitness to drive. *Br Med Bull* 2008;87:163-74.
13. Agunloye O. Guidelines for the National Drivers License Scheme. Public Education Department Headquarters, Lagos, Nigeria. Federal Road Safety Commission 1990;6-9.
14. Ovenseri-Ogomo G, Adofo M. Poor vision, refractive error and barrier to treatment among commercial vehicle drivers in the Cape Coast municipality. *Afr Health Sci* 2011;11:97-102.
15. Adekoya BJ, Owofeye JFA, Adepoju FG, Ajaiyeoba AI. Visual function survey of commercial intercity vehicle drivers in Ilorin, Nigeria. *Can J Ophthalmol* 2009;44:261-4.
16. McMoli TE, Ogunmekan IO. Road traffic accidents in Nigeria: observation on controllable human factors in Lagos. *Afr Ann Med* 1983;1:30-3.
17. McConnell RA, Spall AD, Hirst LW, Williams GA. Survey of the visual acuity of Brisbane drivers. *Med J Aus* 1991;155:107-11.