Visual impairment among commercial intercity vehicle drivers in Dutse, Jigawa State, Nigeria

Usman Shehu Ibrahim,[1] Rabiu Ibrahim Jalo,[2] Fatimah Isma'il Tsiga-Ahmed,[2] Hadiza Musa Abdullahi,[2] Auwal Umar Gajida,[2] Usman Muhammad Ibrahim,[3] Aminatu Kwaku Ayaba,[3] Nafisat Tijjani Abdullahi,[3] Abdullahi Idris,[4] Taiwo Amole Gboluwaga[2,5]

[1]University Clinic, Federal University Dutse, Jigawa State; [2]Department of Community Medicine, Bayero University/Aminu Kano Teaching Hospital, Kano; [3]Department of Community Medicine, Aminu Kano Teaching Hospital, Kano; [4]Department of Ophthalmology, Rashid Shekoni Specialist Hospital, Dutse, Jigawa State; [5]African Center of Excellence for Population Health and Policy (ACEPHAP), Bayero University, Kano, Nigeria

Abstract

Good vision is an essential component of safe driving and it is one of the most important requirements for commercial drivers. Little is known about the visual acuity of commercial drivers and the perceived effect on driving in our setting. The study assessed the prevalence and pattern of visual impairment among commercial intercity vehicle drivers in Dutse, Jigawa State, Nigeria. A systematic sampling technique was used to select 172 commercial intercity vehicle drivers in four major motor parks in Dutse. All respondent were tested for distance visual acuity using Snellen's tumbling E chart and categorised as normal (VA≥6/12) or vision impaired (VA<6/12). Drivers with impaired vision were further assessed to determine those due to uncorrected refractive error. Data was analysed using SPSS version 20.0. The mean age (±SD) of the respondents was 41.7 (±11.1) years. Prevalence of visual impairment was found to be 11.0% (n=19). Of those with visual impairment, majority (n=16; 84.2%) had impairment relating to uncorrected refractive errors, while the rest (n=3; 15.8%) had impairment originating from background pathology (diabetes, cataract and glaucoma). A third (32%) of the respondents had been involved in Road Traffic Accidents (RTAs) in the past. However, there was no statistically significant association between visual impairment and involvement in RTA (χ^2= 0.002, p= 0.90). Visual impairment mainly in the form of uncorrected refractive error was prevalent among commercial drivers in Dutse. Government and trade unions should introduce programs to ensure provision of appropriate eye care for all commercial drivers in the state.

Correspondence: Dr. Rabiu Ibrahim Jalo, Department of Community Medicine, Bayero University/Aminu Kano Teaching Hospital, Kano, Nigeria.
E-mail: rabiuibrahimjalo@yahoo.com

Key words: Visual impairment, refractive error, prevalence, drivers, Dutse.

Contributions: USI, RIJ, FIT, HMA, AUG, AI and ATG participated in conception, design, and interpretation of data, drafting of manuscript and revising it critically for important intellectual content. AAK, NTA and UMI contributed in data collection and analysis.

Conflicts of interest: The authors declare no conflicts of interest.

Funding: None.

Ethics approval and consent to participate: The protocol for this study was submitted to the Health Research Ethics Committee of Ministry of Health, Jigawa State, Nigeria for review and approval before commencement of data collection. Ethical approval with reference number (MOH/SEC.3/S/813/I) was obtained. Informed consent was obtained from all the patients that participated in the study.

Received for publication: 28 March 2020.
Accepted for publication: 19 June 2020.

Annals of African Medical Research 2020; 3:113
doi:10.4081/aamr.2020.113

Introduction

Good vision has been identified as a fundamental component of safe driving as it is one of the most important sensory requirements a driver needs to carry out his job; and has been documented to accounts for about 95% of the sensory requirements.[1] Thus, drivers' involvement in Road Traffic Accidents (RTAs) is likely to be associated with visual impairment. RTAs are a major public health problem worldwide and a leading cause of death and trauma, with an estimated annual death of 1.2 million and up to 50 million injuries worldwide.[1] The World Health Organization (WHO) estimates that these figures could increase by more than half over the next 20 years unless there is a firm commitment to road safety and accident prevention especially in developing countries such as Nigeria, where the mortality from RTAs ranks one of the highest.[2] The causes of RTAs are multifactorial and include poor maintenance of roads and vehicles, absence of appropriate road signs and poor driving skills. More so, inadequate training, inattentiveness, alcoholic intoxication, drug intake, excessive speeding, wrong overtaking, poor knowledge of traffic regulations and physical disability including poor vision (visual impairment) are all factors that could be responsible for the occurrence of RTAs.[2]

Commercial vehicles are the major source of motorised transportation in many low and middle-income countries including Nigeria. In the absence of multiple and reliable public transport infrastructure, most people rely on road transport for commuting

and Commercial Intercity Vehicle Drivers (CIVDs) constitutes an important part of the transport network. Therefore, maintaining optimal visual function is essential so as to maintain smooth conduct of public transportation and avoidance of essential risks for RTAs.[3] Visual impairment is a functional limitation of the eyes or visual system due to a disorder or disease that can result in a visual disability or a visual handicap.[1] Visual impairment from uncorrected refractive error or existing medical conditions are common among general population including CIVDs.

A range of conditions (medical and uncorrected refractive errors) result in visual impairment through deficits in the eye or the visual pathway. Assessment of visual function can be done through various means such as visual acuity, contrast sensitivity, colour vision and visual fields. However, visual acuity is the aspect of vision commonly measured during licensing.[4] WHO estimated that there are about 2.2 billion people with vision impairment or blindness globally, of whom about 1 billion have a vision impairment that could have been prevented or is yet to be addressed.[2] In Canada, cataract and visual pathway disease were the most common causes of visual impairment, both accounting for 40% of visual impairment with age-related macular degeneration and other retinal diseases as the next most common causes of vision loss.[5] Review of recent surveys on visual impairment in Latin America indicated that low vision occur more in rural Guatemala compared to Buenos Aires, and cataract was observed to be the main cause of low vision (41-87%), followed by posterior segment disease (7-47%) while in Australia, the occurrence of visual impairment in middle-aged people reported age-related macular degeneration, diabetic retinopathy, hemianopia or quadrantanopia and retinitis pigmentosa (RP) as conditions accounting for the majority of non-correctable visual field loss.[4,6] Similarly, assessment of ocular status of commercial drivers in Osun, western part of Nigeria noted that eye diseases causing visual impairment and uncorrected refractive errors were seen to be common among commercial vehicle drivers.[7] Furthermore, road traffic accident was associated with visual impairment and field loss while RTA was less likely to occur among those who could read number plates (OR=0.51).[7] A study in Ilorin (Nigeria), observed that significant percentage of CIVDs studied had an inadequate level of visual acuity (VA) for their class of license and a much larger percentage did not undergo any form of eye test, either at first licensing or at renewals.[3]

The spate of fatal road accidents in Nigeria is phenomenal and in order to set policies and priorities; it is essential to have up to date information on prevalence and pattern of visual impairment among CIVDs.[7,8] Vision plays a vital role in driving and efficient visual functioning of the driver is essential for road safety. A significant loss of visual function can diminish a driver's ability to operate a motor vehicle safely and can thus contribute to road traffic injury.[8] However, there is little evidence indicating that defects of vision alone cause road traffic accidents as little research has been conducted to assess the relationship between visual impairment and road traffic accidents in northern Nigeria. The study therefore aimed to assess prevalence and pattern of visual impairment among commercial drivers in Dutse, Jigawa State (Nigeria).

Materials and methods

Study area

Dutse is a city located in northern Nigeria, and has a projected population of 246,143 based on 2006 census.[9] Dutse is the administrative capital of Jigawa state of Nigeria which was created in 1991. Dutse (Dutsi, in earlier notes) got its name from the rocky topography peculiar to the area. Different forms of rocks can be seen widely spread across the town. Mostly igneous in nature, the rocky town got its name from these naturally endowed resources, Dutse (Hausa term for rock). Dutse and its environ are well known for Date Trees (Dabino) of different variety. The area is characterized with undulating topography and hilly walls. Dutse town is made up of two wards out of the eleven wards that make up the whole local government area, namely Kaci & Jigawa-Tsada. The coordianates of dutse are 11^0 42'04" N, 9^0 20'31" and 300meters above sea level.[9] There are two secondary health facilities that provide ophthalmology services within the state capital.

Study design

A descriptive cross-sectional study design was used.

Study population

The study population comprised of all drivers registered with National Road Transport Owners (NARTO), National Union of Road Transport Workers (NURTW) and Township Union within Dutse Metropolis. Commercial drivers who were not registered with the transport unions and those absent during the two weeks study period were excluded.

Sample size determination

Sample size was calculated using Fishers' formula[10] for determining minimum sample size for descriptive studies ($n=Z^2pq/d^2$), based on standard normal (Z) deviate of 1.96 at 95% confidence interval and prevalence rate of 11.5% reported from previous similar study.[3] The estimated sample size was further adjusted for non-response by adding 10% to the calculated minimum sample size. Therefore, a sample size of 172 was obtained.

Sampling technique

A systematic sampling technique was used to select respondents from the four motor parks in Dutse metropolis. The list of registered drivers operating in these parks was obtained from the unions and this was used as the sampling frame. Using the calculated sample size of 172; the sampling fraction and interval were obtained. Within the sampling interval, starting points were obtained using simple random sampling and subsequent eligible respondents selected by adding the sampling interval.

Study instrument

An interviewer–administered, pre-tested, semi-structured questionnaire adapted from previous studies was used to collect data from eligible respondents.[11,12] The questionnaire was translated into local Hausa language by a professional Hausa tutor in a higher institution in Jigawa (Federal University, Dutse). The Hausa translated version was translated back to English by another independent English tutor in the same higher institution to ensure accuracy. The questionnaire has three sections that sought information on socio-demographic characteristics, prevalence and pattern of visual impairment among the respondents.

Each respondent was assessed for eligibility and then subjected to visual acuity and pinhole examinations. Two trained research assistants (optometrists) conducted the assessment independently.

Measurement of variables

Prevalence of visual impairment was assessed using tumbling Snellen's E chart for visual acuity measurement. Respondents'

Visual Acuity (VA) was categorized as either normal (VA≥6/12) or impaired (VA<6/12).[13]

Pattern of visual impairment was assessed with the aid of a pin-hole examination among those with impaired visual acuity and respondents were categorized as having uncorrected refractive error or other pathologies.

Data analysis

Data collected was cleaned, entered into Microsoft excel spreadsheet and analysed using IBM SPSS version 20.0 (Armonk, New York, USA). Age of the respondents was summarised using mean and standard deviation while frequencies and percentages were used to summarised qualitative variables (age group, education, marital status, religion, prevalence and pattern of visual impairment).

Prevalence of visual impairment was the dependent variable while the independent variables included age group, income, tribe, education, marital status, religion and working hours per day. Chi-square test or the Fisher's exact test was used as appropriate to analyse factors associated with visual impairment. In all tests of significance, P<0.05 was considered statistically significant.

Ethical considerations

The protocol for this study was submitted to the Health Research Ethics Committee of Ministry of Health, Jigawa State, Nigeria for review and approval before commencement of data collection. Ethical approval with reference number (MOH/SEC.3/S/813/I) was obtained. Information about the study was provided to the participants in plain language. After explaining, they were requested to ask questions on any aspect of the study that was not clear to them. They were informed that their participation was voluntary, and they could leave the study at any time they so wish or decline to respond to any question or visual assessment. Informed consent was obtained from all the patients that participated in the study.

Results

A total of 172 respondents were approached and they all participated giving a response rate of 100%. The mean age (±SD) of respondents was 41.7 (±11.1) years with majority (n=105; 61%) in their 3rd and 4th decades of life. Most (95.9%) of them were married and had secondary education (37.8). About half (n=92; 53%) of them were members of NURTW. Many (84.3%) of the respondents had a daily income of at-least ₦1000 and only 6 (3.5%) were using any form of recommended/prescription glasses (Table 1).

Visual acuity was determined using tumbling Snellen's E chart and the prevalence of visual impairment was found to be 11.0% among commercial intercity drivers in Dutse (Table 2). About a third 55 (32%) of the respondents had been involved in road traffic accident in the past. However, there was no statistically significant association between visual impairment and involvement in RTA (χ^2=0.002, P=0.90). Of those with visual impairment (n=16; 84.2%) had impairment relating to uncorrected refractive errors while the rest (n=3; 15.8%) had impairment originating from background pathology: diabetes, cataract and glaucoma (Table 3). At bivariate level of analysis, visual impairment was found to be significantly associated (P<0.05) with level of education of commercial intercity drivers in Dutse (Table 4).

Table 1. Socio-demographic characteristics of Commercial Intercity Vehicle Drivers (CIVDS) in Dutse.

Socio-demographic characteristics Variable	Frequency (n= 172)	Percentage (%)
Age group (years)		
20- 29	22	12.8
30- 39	53	30.8
40- 49	52	30.2
50- 59	30	17.4
≥60	15	8.7
Marital status		
Single	7	4.1
Married	165	95.9
Level of education		
Informal/Quranic	35	20.4
Primary	30	17.4
Secondary	65	37.8
Tertiary	42	24.4
Tribe		
Hausa	135	78.5
Fulani	35	20.3
Others	2	1.2
Union		
NARTO	40	23.5
NURTW	92	53
TOWNSHIP	40	23.5
Income per day (₦)		
<1000	27	15.7
≥1000	145	84.3
Working days per week		
1-5 Days	65	37.8
>5 Days	107	62.2

Discussion

The study found a high prevalence of visual impairment as one in ten of the drivers were visually impaired and this can have negative consequences for both the driver and community members. This finding is similar to that of a cross sectional descriptive study which reported the prevalence of visual impairment among commercial intercity vehicle drivers in Ilorin (Nigeria) of 11.5% while another study in Osun State (Nigeria) reported a lower prevalence of visual impairment (3.3%-6.1%) among commercial drivers.[3,7,14] Relatively similar prevalence were reported in other countries; studies among commercial drivers in Ghana, Ethiopia and Malaysia reported a visual impairment prevalence of 6.7%-12%.[8,15,16] A similar study which determined the visual fitness of public drivers in southeast Iran found that 18.3% of the drivers had poor vision.[17] The use of visual acuity and pin-hole test might have over-estimated the prevalence of refractive error seen in this survey and hence the need for caution in interpreting our findings. Existence of variable forms of visual impairment among commercial intercity drivers necessitates the need for comprehensive eye care services for this category of workers so as to ensure occupational safety and wellbeing.

The pattern of visual impairment among those with impaired vision in this survey was predominantly uncorrected refractive error (84.2%), other pathologies (diabetes, cataract and glaucoma) were also seen. This might be responsible for the high occurrence of RTAs reported by the respondents as one in three of them had accident within the last one year. However, poor road conditions, vehicular malfunction and other factors could account for the high occurrence of accidents reported in this study. This finding is similar to that of a cross sectional descriptive study conducted in Ilorin, which found uncorrected refractive error as the commonest form of visual impairment.[3] Another survey in Osun (Nigeria) reported uncorrected refractive error was seen in 31.3% of those with visual impairment while pathologies like corneal opacity and pterygium accounted for 24.3% and 20.7% of ocular impairments

Table 2. Prevalence of visual impairment using visual acuity among Commercial Intercity Vehicle Drivers (CIVDs) in Dutse.

Variable	Frequency (n= 172)	Percentage (%)
Visual impairment		
Normal (VA ≥ 6/12)	153	89.0
Impaired (VA < 6/12)	19	11.0

Table 3. Pattern of visual impairment among Commercial Intercity Vehicle Drivers (CIVDs) in Dutse.

Variable	Frequency (n= 172)	Percentage (%)
Pattern of Visual impairment		
Uncorrected Refractive Error	16	84.2
Pathology	3	15.8

Uncorrected Refractive Error = VA improves with pinhole.

Table 4. Factors associated with visual impairment among CIVDs in Dutse.

Variable	Visual impairment		Total (%)	P value
	Normal (%)	Impaired (%)		
Age group (years)				
20 -24	2(100)	0(0)	2(1.2)	0.80
≥ 25	151(88.8)	19(11.2)	170(98.8)	
Marital status				
Single	7(100)	0(0)	7(4.1)	
Married	146(88.5)	19(11.5)	165(95.9)	0.40
Tribe				
Hausa/Fulani	151(88.8)	19(11.2)	170(98.8)	
Non-Hausa Fulani	2(100)	0(0)	2(1.2)	0.84
Education				
Non-Formal	25(75.8)	8(24.2)	33(19.2)	
Formal	128(92.1)	11(7.9)	139(80.8)	0.01*
Income per day (₦)				
<1000	22(81.5)	5(18.5)	27(15.7)	
≥1000	131(90.3)	14(9.7)	145(84.3)	0.18
Working days per week				
≤5days	59(90.8)	6(9.2)	65(37.8)	
>5 days	94(87.9)	13(12.1)	107(62.2)	0.06
RTA				
Yes	49(89.1)	6(10.9)	55(31.9)	
No	104(88.9)	13(11.1)	117(68.1)	0.90

*Statistically significant.

respectively.[7] The study was able to diagnose and differentiate these conditions because further ophthalmological assessments were conducted as part of their study. In Mozambique, pathological conditions were found to be the leading cause of visual impairment among commercial vehicle drivers.[18] Another study among commercial vehicle drivers in the central region of Ghana, observed that about 60% of those with visual impairment had uncorrected refractive error.[1] In contrast, a study to determine the prevalence and causes of visual impairment in an elderly Chinese population in Taiwan found the leading cause of visual impairment was cataract (41.7%), followed by myopic macular degeneration (12.5%) and age-related macular degeneration (10.4%).[19] This differs from the finding of this study because the participants were mainly elderly in which higher rate of pathology-related visual impairment is expected. A study in Ghana established relationship between visual functions and the occurrence of road traffic accident among commercial vehicle drivers.[1] However, this study didn't find such association and this may be due to fewer number of subjects examined. The survey provided evidence for the existence of visual impairment as well as other ocular pathologies among commercial intercity drivers in Dutse, Nigeria but was limited, as it did not use other sensitive diagnostic methods like optical coherence tomography or gonioscopy. Future research efforts should explore the use of higher diagnostic equipment and enroll a larger number of CIVDs.

Conclusions

Visual impairment mainly in the form of uncorrected refractive error was prevalent among commercial drivers in Dutse. Government and trade unions should introduce programs to ensure provision of appropriate eye care for all commercial drivers in the state.

References

1. Samuel BK, Kyei S, Asare FA, et al. Visual function among commercial vehicle drivers in the central region of Ghana. Journal of Optometry. 2016;9:54-63.
2. Bourne RA, Flaxman SR, Braithwaite T, et al. Magnitude, temporal trends and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis. Lancet Glob Health. 2017;5:e888–97.
3. Adekoya BJ, Owoeye JFA, Adepoju FG, Ajaiyeoba AI. Visual function survey of commercial intercity vehicle drivers in Ilorin, Nigeria. Can J Ophthalmol 2009;44:261–4.
4. Muir C, Charlton JL, Odell M, et al. Medical review licensing outcomes in drivers with visual field loss in Victoria, Australia. Clin Exp Optom 2016;99:462–468.
5. Maberley DA, Hollands H, Chuo J, et.al. The prevalence of low vision and blindness in Canada. Eye (Lond) 2006;20:341-6.
6. Limburg H, Barria F, Gomez P, et al. Review of recent surveys on blindness and visual impairment in Latin America. Br J Ophthalmol 2008;92:315-9.
7. Senjam SS, Vashist P, Gupta N, et.al. Prevalence of visual impairment due to uncorrected refractive error. Results from Delhi-Rapid Assessment of Visual Impairment Study. Indian J Ophthalmol 2016;64:387-90.
8. Biza M, Mossie A, Woldemichael K, Gelaw Y. Visual impairment and road traffic accidents among drivers in Jimma Town, Southwest Ethiopia. Ethiop Med J 2013;51:123-32.
9. Gumel BI, Dutse business climate. 2019.
10. Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample size calculation in medical studies. Gastroenterol Hepatol 2013;6:14–7.
11. Naidoo KS, Leasher J, Bourne RR, et.al. Vision Loss Expert Group of the Global Burden of Disease Study; Global Vision Impairment and Blindness Due to Uncorrected Refractive Error, 1990-2010; Optom Vis Sci 2016;93:227-34.
12. Napper G, Fricke T, Anjou MD, Jackson AJ. Breaking down barriers to eye care for Indigenous people: a new scheme for delivery of eye care in Victoria. Clin Exp Optom 2015;98:430-4.
13. Darge HF, Shibru G, Mulugeta A, Dagnachew YM. The Prevalence of Visual Acuity Impairment among School Children at Arada Subcity Primary Schools in Addis Ababa, Ethiopia. J Ophthalmol 2017;2017:9326108. doi:10.1155/2017/9326108
14. Oladehinde MK, Adeoye AO, Adegbehingbe BO, Onakoya AO. Visual functions of commercial drivers in relation to road accidents in Nigeria. Indian J Occup Environ Med 2007;11:71–5.
15. Ovenseri-Ogomo G, Adofo M. Poor vision, refractive errors and barriers to treatment among commercial vehicle drivers in the Cape Coast municipality. Department of Optometry, University of Cape Coast, Ghana. African Health Sciences 2011;11:97-102.
16. Haliza AM, Syah M, Norliza MF. Visual problems of new Malaysian drivers, Malaysian Family Physician 2010;5:1985-2274.
17. Sharifi A, Sharifi H, Karamouzian M, Daneshtalab E, and Daneshtalab A. Visual Fitness of Public Vehicle Drivers in Southeast of Iran. Int J Prev Med 2013;4:705-709.
18. Thompson S, Naidoo K, Gonzalez-Alvarez C, et al. Barriers to use of refractive services in Mozambique. Optom Vis Sci 2015;92:59-69.
19. Hsu WM, Cheng CY, Liu JH, Tsai SY, Chou P. Prevalence and causes of visual impairment in an elderly Chinese population in Taiwan; the Shihpai Eye Study. Ophthalmology 2004;3:62-9.