

Visual Assessment of Commercial Drivers in the South West Region of Cameroon

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Abstract

Background: Driving is a visually intensive task. In Cameroon where the burden of road traffic deaths is high, visual assessment is not universally performed before the issuance of driver's licenses. This study assesses the visual status of commercial drivers (CDs) in the Southwest Region of Cameroon.

Methods: This was a cross-sectional community-based study on CDs in Limbe and Buea. Questionnaires were used to assess socio-demographic parameters, the incidence of road traffic crashes (RTCs), and self-reported visual status. Visual acuity (VA) was measured using a standard Snellen chart at 6 meters. Statistical analysis was done using descriptive methods; frequencies, paired Student's t-test, and Chi-square test.

Results: 207 CDs were enrolled. All were male, with a mean age of 41.8 ± 12.1 years. 15.0% had undergone an eye exam prior to licensure, and 3.4% within the past 10 years. VA in the better-seeing eye was less than 6/9 and 6/12 in 14.1%, and 10.6% of CDs, respectively. 75% of CDs with self-reported poor vision and 95% of CDs with $VA < 0.5$ had a history of an RTC compared to 55.8% of CDs with self-reported good vision and 55.7% of CDs with $VA \geq 0.5$ ($p < 0.05$). Injuries from RTCs were more common in CDs with self-reported poor vision (81.1%) and in those with $VA < 0.5$ (90.5%) compared to CDs who self-reported good vision (55.8%) and those with $VA \geq 0.5$ (55.7%) $p < 0.05$.

Conclusion: A large proportion of CDs did not have a visual assessment before the issuance or renewal of their driver's licenses. A considerable number had poor vision in their better-seeing eye and suffered more from RTCs and related injuries. The concerned authorities should consider making vision tests a necessary requirement for the obtention of driver's licenses.

Background

Globally, mortality and life-long disability from road traffic crashes are on a steady rise, the greatest burden in low- and middle-income countries (93% of all road traffic deaths).¹ Road traffic injury is the eighth leading cause of death amongst all age groups, surpassing deaths from the Human Immunodeficiency Virus (HIV/AIDS), tuberculosis, and diarrheal diseases.² The worst rates of road traffic crashes (RTC) are in sub-Saharan Africa (26.6 deaths per 100,000 population); In Cameroon, 30.1 deaths per 100,000 population, as compared to 9.3 deaths per 100,000 population in Europe.^{1,3} Factors that contribute to these gruesome figures include impaired driving, speed driving, driving under the influence of alcohol or drugs, the non-use of protective gear, unsafe roads and vehicles, inadequate law enforcement on traffic laws and poor post-crash care.⁴

Driving is a visually intensive task. Vision alone contributes to about 95% of driving-related information input.⁵ It is expected that the visual function of a driver allows them to quickly read, understand and act on standard traffic control signs while moving at the maximum allowed speed in different lighting conditions.⁶ Visual acuity (VA) is an important aspect of visual function, playing an important role in

driver safety and performance.⁷ The widely accepted consensus for nonprofessional drivers is a visual acuity of at least 0.5 (6/12) in the better seeing eye, with other specific requirements like visual fields and contrast sensitivity differing from country to country and type of driver's license.⁸ There is no global accord on the basic visual requirements for commercial drivers, but it is widely accepted that commercial drivers should have more stringent obligations.

In developing countries like Cameroon, the road is the major means of transportation, mostly through public or commercial means. Driving with low vision is a potential hazard to oneself and other road users thus necessary to set minimal vision requirements before the issuance or renewal of a driver's license.⁹ Minimum visual requirements are neither clearly established nor reinforced for the acquisition of drivers licenses in Cameroon. A medical certificate validating fitness to drive is however a requirement, but physicians are not obliged to perform a visual acuity exam.¹⁰ There are also no minimum visual requirements for commercial drivers (CDs). These lapses prompted this study, aimed at assessing the visual status of commercial inter-urban and intra-urban drivers in the Southwest Region of Cameroon.

Methods

This was a cross-sectional descriptive study on visual acuity assessment of CDs in the Limbe and Buea subdivisions of the Fako Division of the South West Region of Cameroon. Limbe is a coastal city with many touristic attractions and Buea is a mountainside city which houses one of the largest universities in Cameroon. There is significant traffic within and between these two cities located about 40 km apart, both situated about 75 km from Douala the largest city in Cameroon. Our target population was commercial intra-city and intercity drivers that were ≥ 18 years old and gave consent for the study. We excluded anyone who was sick or did not give consent for the study.

This minimum sample size was estimated using the Lorenz formula as seen below

$$N = [p(1-p)(z)^2] / d^2$$

Where.

N = Minimum sample size required for this study

P = Expected prevalence in population. We got our P from a study carried out in the north central state of Nigeria that gave a prevalence of 9.1% (visual acuity < 6/18) in the better eye without correction (10)

d = Precision = 0.05

z = coefficient of significance = 1.96

Therefore, minimum sample size N = 128 drivers

Using convenience, consecutive non-probability sampling, we approached and recruited commercial motor drivers that met the inclusion criteria. They were given a standard questionnaire to fill and their visual acuity was assessed using a standard Snellen chart, mounted 6 meters away from the participant, in a well-lighted private setting. Each eye was assessed at a time by occluding the other, and the participant could put on any form of refractive correction they used while driving, if available.

The questionnaire had questions on socio-demographic parameters, driving license acquisition, driving safety, involvement in RTCs, and their self-reported visual status. They were mainly closed-ended multiple choice and checkbox questions, using the 5-points Likert scale wherever appropriate. The data was then coded and entered to a password-protected computer.

Ethical clearance was obtained from the Institutional Review Board of the Faculty of Health Sciences, University of Buea, and the study was conducted according to the tenets of the Helsinki declaration. Statistical analysis was performed using the SPSS Statistics software, version 25.0 (IBM Corporation, Somers, NY). Frequency counts and percentages were generated where appropriate, the Paired Student t-test was used to compare means, and the chi-square test was used to compare proportions. Statistical significance was set at a p-value of less than 0.05.

Results

Two hundred and seven (207) commercial drivers were interviewed and examined, 104 (50.2%) were taxi drivers, 56 (27.1%) were bus drivers and 47 (22.7%) were truck drivers. They were all male and the mean age of the drivers was 41.8 ± 12.1 (Range 22–72 years). Most drivers (56.5%) had attained at least a secondary level of education (no education, 5.8%; primary 37.7%; secondary, 30.4%; tertiary, 16.9%; vocational training, 9.2%) and 66.2% were married (Table 1).

Table 1
General Characteristics of the Commercial Drivers

Characteristic		Frequency (n)	Percentage (%)
Age group	20–30	35	16.9
	31–40	79	38.2
	41–50	43	20.8
	51 – 60	36	17.4
	> 60	14	6.8
Education	None	12	5.8
	Primary	77	37.2
	Secondary	64	30.9
	Tertiary	35	16.9
	Vocational	19	9.2
Marital status	Divorced	3	1.5
	Married	137	66.2
	Single	61	29.5
	Widowed	6	2.9
Type of vehicle	Bus	56	27.1
	Taxi	104	50.2
	Truck	47	22.7

Even though 89.4% of the drivers possessed a driver's license, only 62.8% had ever done a driving test. 73.4% had renewed their license on expiration at some point. 15.0% had undergone an eye exam with visual acuity testing prior to licensure and 3.4% reported haven done an eye examination within 10 years prior the study.

VA in the better-seeing eye was assessed to be less than 6/9 and 6/12 in 14.1% and 10.6%, respectively. None of these CD's were wearing spectacles or had other forms of refractive correction. Table 2 shows the distribution of their visual acuity in the better and worse seeing eye.

Table 2
Visual Acuity Distribution in the Better and Fellow
Eyes of Commercial Drivers

Visual Acuity	Better Eye (%)	Fellow Eye (%)
≥ 6/9	177 (85.9)	145 (70.9)
< 6/9 ≥ 6/12	8 (3.9)	33 (15.9)
< 6/12 ≥ 6/18	15 (7.2)	16 (7.7)
< 6/18 ≥ 6/24	6 (2.9)	0 (0)
< 6/24 ≥ 6/36	1 (0.5)	12 (5.8)
Total	207 (100)	207 (100)

About a quarter (24.6%) of all the CDs self-reported poor vision. The characteristics, rates of accidents and injuries amongst them were compared to that of the other drivers (Table 3).

Table 3
Comparison between CDs with Self-Reported Poor Vision to CDs with Self-Reported Good Vision

Characteristic	Self-reported Poor vision	Self-reported good vision	p-value
Number	51 (24.6%)	156 (75.4%)	
Mean age	53.53 ± 12.29	37.97 ± 9.21	0.000
History of RTC	37 (72.5%)	87 (55.8%)	0.048
Mean RTCs over 10 years	1.75 ± 1.64	1.03 ± 1.40	0.003
Number of injuries	7 (18.9%)	49 (56.3%)	0.000
Mild injury	28 (75.7%)	34 (39.1%)	0.000
Severe injury	2 (5.4%)	4 (4.6%)	1.000
Mean Logmar VA	0.2603 ± 0.24	0.0283 ± 0.09	0.000
Proportion who did driving test	42 (82.4%)	88 (56.4%)	0.001
Mean number of years driving	29.10 ± 13.02	14.20 ± 8.74	0.000
Proportion with level of education above primary	42 (82.4%)	75 (48.1%)	0.000
VA = Visual Acuity			

CDs with self-reported poor vision were older (mean age 53.53 ± 12.29, p = 0.00), had more RTCs (72.5%, p = 0.048) and had a higher average number of accidents of the previous 10 years (1.75 ± 1.64, p = 0.003). Similarly, the CDs with VA < 0,5 had worse parameters when compared to CDs with VA ≥ 0.5. Ninety-five

percent (95%) of them had a history of an RTC over the past 10 years, and a higher average number of RTCs (2.91 ± 1.72 , $p = 0.00$) and related injuries (81.1%) [Table 4].

Table 4
Comparison between CDs with VA < 0.5, to CDs with VA \geq 0.5 in the Better Seeing Eye

Characteristic	VA < 0.5	VA \geq 0.5	p-value
Number	22 (10.6%)	185 (89.4%)	
Mean age	57.50 \pm 12.633	39.95 \pm 10.56	0.000
History of RTC	21 (95.5%)	103 (55.7%)	0.000
Mean number of RTCs over 10 years	2.91 \pm 1.72	1.01 \pm 1.33	0.000
No injury	2 (9.5%)	54 (52.4%)	0.000
Mild injury	14 (66.7%)	48 (46.6%)	0.044
Severe injury	5 (23.8%)	1 (1.0%)	0.000
Proportion who reports poor vision	19 (86.4%)	32 (17.3%)	0.000
Proportion who did driving test	13 (59.1%)	117 (63.2%)	0.816
Possess valid driving license	20 (90.9%)	165 (89.9%)	1.000
Mean number of years driving	37.00 \pm 9.23	15.71 \pm 10.02	0.000
Proportion with level of education above primary	16 (72.7%)	101 (54.6%)	0.117
VA = Visual Acuity, CD = Commercial driver			

According to the CDs, the most common cause of RTC were bad roads, poor vision, poor state of vehicles and human-related factors like insobriety (Fig. 1).

Discussion

We assessed the visual acuity (VA) of commercial drivers (CDs) in a setting where there is no enforced rule obliging the visual assessment of drivers before issuance or renewal of drivers' licenses. In such settings, bad driving conditions and poor road infrastructure may require even better visual abilities than in developed countries to ensure safe driving. In this study which included 207 drivers, all the drivers were male, with the greater proportion (38.2%) in the 31–40 years age group (mean age: 41.8 ± 12.1 years). Young males generally make up the bulk of commercial drivers in Africa.^{11–13} High-risk and physically demanding occupations like this are generally left for the relatively younger and stronger men, who can drive long hours, manage vehicle maintenance and handling of passengers' luggage. In this study, though 5.8% of the respondents had no formal education, meaning they may not be able to read road signs, most (57%) of the drivers had attained a secondary level of education with up to 16.9% haven attained the university education. Our findings are like those reported by Okafor et al. in a highly literate community in

Nigeria¹³ and contrast that of other studies conducted in Africa.¹²⁻¹⁴ This study area abodes the first Anglo-Saxon University of Cameroon and could explain the higher literacy level of the commercial drivers, which may likely be university dropouts or graduates who did not find a white-collar job.

Though over 89.4% of the drivers possessed a valid driving license, only 62.8% had done a driving test, and 15% percent an eye examination. This means that a significant proportion of commercial drivers do not do a driving test (37.2%), and 85% do not undergo a visual assessment examination. Comparable results were seen in a Nigerian study where Chidi-Egboka et al. reported that though 97.7% of drivers had a formal driving license, only 83.5% had undergone a formal driving test.¹¹ This could be due to the constant policing of the forces of law and order on the roads, making it difficult to drive without a valid driving license and highlights the ease with which these drivers can obtain a driver's license without fulfilling the official state requirements. However, in both this study and that of Chidi-Egboka et al.¹¹, less than a third of those who had a formal driving test, had their eyes examined. CDs who had a formal driving test can be considered as those who were willing to comply with the rules and regulations, but if those rules do not mandate eye examinations as an integral part of assessing the general fitness to drive, then it is expected that people with poor vision will drive while owning valid licenses.

VA in the better seeing eye in our study, was assessed to be less than 6/9 and 6/12 in 14.1% and 10.6% of the drivers, respectively. Our findings are comparable to those done in other neighboring developing countries where there are clearly stipulated regulations stipulating a minimum required VA of 6/9 in the better-seeing eye to drive. In Nigeria, Dairo et al. reported that 15.3% and 9.1% of intra-city commercial drivers in Ibadan had vision of less than 6/9 and 6/12, respectively in their better seeing eye¹⁵ while in Ghana, Ovenseri-Ogomo et al., reported that 12.1% of commercial vehicle drivers in the Cape Coast municipality had vision less than 6/9 in their better seeing eye.¹² Despite the existence of regulations in these countries, Nwosu reported that in Nigeria, driver's licenses were mostly issued without visual assessment¹⁶, implying the mere existence of regulations without adequate enforcing measures.

According to the CDs in this study, poor vision was the second most common cause of RTCs. About a quarter (24.6%) of the drivers reported that their vision was poor and was found to have a significantly lower VA in their better-seeing eyes. This group also had a higher proportion of those who completed at least a secondary level of education. This association can be explained by the fact that, with higher levels of education come a higher sense of self-awareness and ease of reporting possible deficits. It is also encouraging because this group of drivers can easily be educated into adopting better eye-health practices and behaviors. Interestingly, when we compared the characteristics of those who had a VA < 0.5 to those with VA ≥ 0.5 in their better-seeing eye, it was like the comparison between CDs with reported poor vision to those with reported good vision. Both the CDs who reported poorer vision and those with VA < 0.5, were older, had been driving for longer periods, had a higher number of reported RTCS over the last 10 years, and sustained more injuries. The link between lower visual acuities and a higher occurrence of RTCs has been described.^{17,18} Given that vision is likely to decrease with age¹⁹, it may be understood why older drivers had a poorer vision. Moreover, none of the drivers had a refractive correction, and

uncorrected refractive errors (often more common in the older population) has been identified as the most important cause of low vision in a similar setting.²⁰ Ovenseri-Ogomo et al., also reported in their study that only 4.9% of the CDs in the Cape Coast municipality in Ghana had spectacles, (70% of whom bought the spectacles from the roadside) and refractive errors were identified as the most common cause of poor vision amongst these drivers.¹² In studies where the visual field assessment was performed using standard perimetry, a strong association was found between visual field defect and occurrence of road traffic crashes.²¹ In this study, visual field assessment was not done, however, a high proportion of drivers (24.6%) reported they had poor vision though a lesser proportion was identified on examination (14.1%). This suggests that VA measures alone, may not be sufficient in screening drivers. Visual field assessments should be considered in vision screening especially in professional drivers.

Conclusions

This study brings to light the visual state of commercial drivers in Cameroon. To our knowledge, it is the first study to assess the visual function of drivers in Cameroon. A large proportion of commercial drivers possess a driver's license despite their inadequate visual abilities. Poor vision is a contributing factor to impaired driving and will adversely affect the incidence of road traffic crashes, mortality, and morbidity. These findings may be allegorical of settings with no established rules regarding visual assessments and driving. To attain the sustainable development goals for road safety by 2030 (to provide access to safe, affordable, accessible, and sustainable transport systems for all), the introduction and implementation of a compulsory minimum requirement for visual function before the obtention of a driver's license in Cameroon and similar settings is essential.

Abbreviations

AIDS: Acquired Immunodeficiency Syndrome

CDs: Commercial Drivers

HIV: Human Immunodeficiency Virus

RTC: Road Traffic Crash

VA: Visual Acuity

Declarations

- Ethics approval and consent to participate

Ethical clearance was obtained from the Institutional Review Board of the Faculty of Health Sciences, University of Buea, Cameroon. All study participants gave informed consent.

- Consent for publication

Not applicable

- Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

- Competing interests

The authors declare that they have no competing interests.

- Funding

No significant sources of funding to declare.

- Authors' contributions

Conception and design of study: BNV, ENN.

Acquisition of data: DAA.

Analysis and/or interpretation of data: BNV, NT, ACM, ENN.

Drafting the manuscript: DAA, BNV, ENN.

Revising the manuscript critically for important intellectual content: JP, ENN.

Approval of the version of the manuscript to be published: BNN, DAA, JP, ACM, NT, ENN.

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Not applicable

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Figures

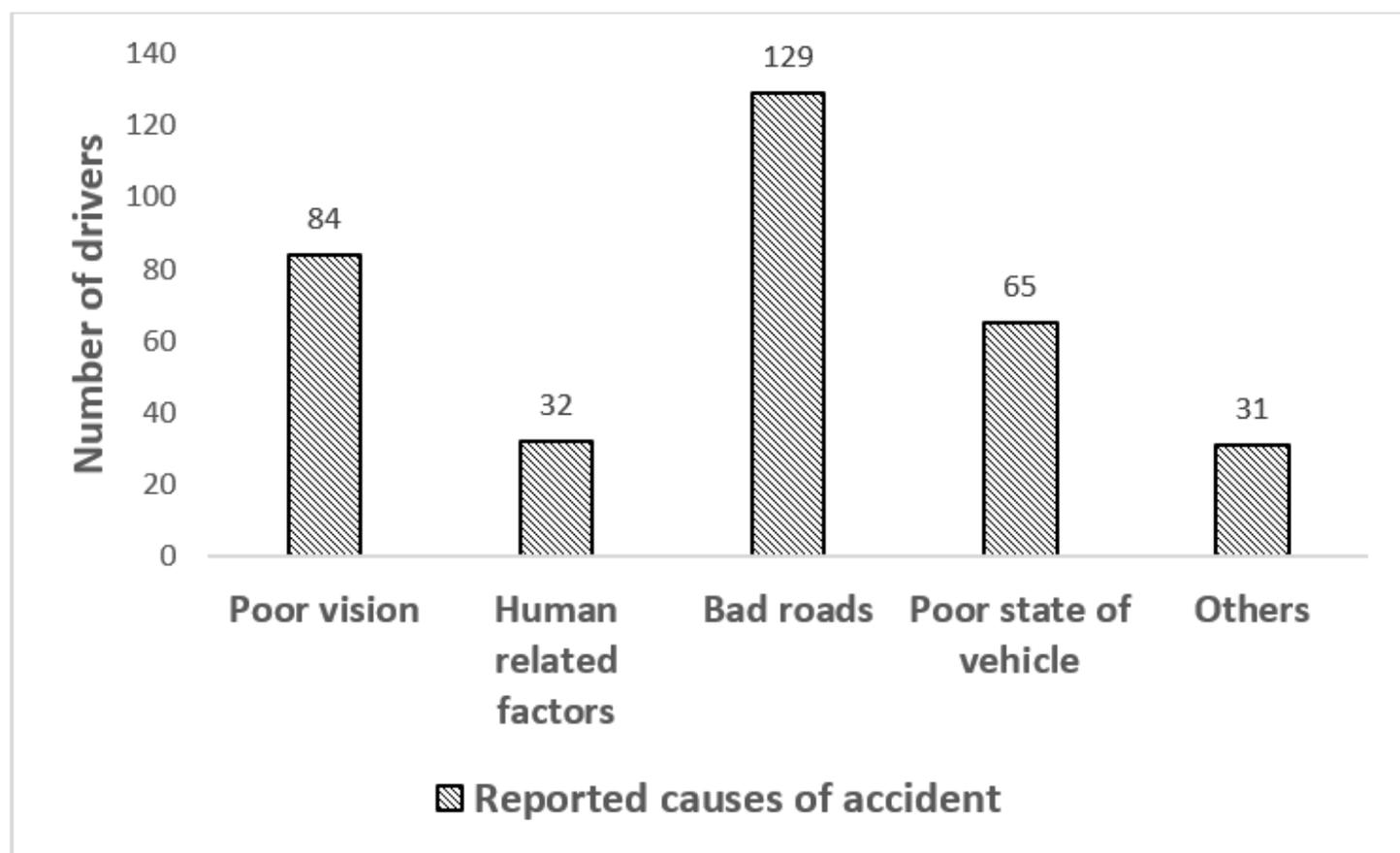


Figure 1

Self-reported Causes of Accidents Amongst Commercial Drivers