

## The Relationship Between Visual Acuity/Visual Field Extent And Road Traffic Accidents Among Commercial Bus Drivers In Aba South Local Government Area In Abia State, Nigeria

Onuoha Nneoma Ezinwanyi, Ihesiulor Chikezie Grand\*, Udo A. Ubani  
Department of Optometry, Abia State University, Uturu, Nigeria.

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**\*Corresponding author:** Ihesiulor Chikezie Grand, Department of Optometry, Abia State University, Uturu, Nigeria.

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### Abstract

A driver is legally required to pass a vision test before a driving permit is issued. This study is aimed at assessing the visual acuity and visual field extent of commercial bus drivers in Aba south L.G.A in Abia State and its effect on road traffic accidents. 120 drivers from 4 motor parks in Aba south L.G.A were interviewed and examined; age ranged from 25-75 years with at least five years of driving experience. There was no significant relationship between road traffic accidents and visual acuity and visual field of commercial bus drivers in the local government area.

**Key Words;** Ophthalmology

### Introduction

The invention of cars has been a source of relief to the sufferings of mankind but the inability of man to manipulate it effectively due to reduced vision has been a major threat to humanity (Ezenyi, 1996). Driving typically forms the primary and referred approach of travel in many countries around the world. Poor vision significantly affects one's driving ability resulting to road traffic accidents (Taylor, 1982). Road traffic accidents (RTA) have become the norm in our society. A research sponsored by the world health organisation (WHO) dealt with the subject "Road traffic accidents fast becoming the number one killer in the African countries" (WHO, 2000).

Road traffic accident is when a road vehicle collides with another vehicle, pedestrian, animal or geographical or architectural obstacle. This of course is attributed to bad roads, absent or improper traffic lights and signs, careless driving, drunkenness, over speeding, not road worthy vehicles, traffic congestion and visual problems among other things. (Eke *et al*, 2000)

Driving requires several sets of abilities which include sensory, mental, motor and compensatory abilities.

Though 95% of the sensory requirement of driving has been shown to be visual. Various workers have

found a connection between visual impairment and occurrence of road traffic accidents (Taylor, 1982).

Vision is very important in driving for instance in reading signs, and sighting oncoming vehicles. According to Holmes (1985) as cited by Ezebuirroh (2006), a major contribution to visual task in addition to psycho motor tasks of driving is that the driver is usually required to navigate, observe and see each side of a point fixated. Navigation while driving is done by pilot age. Pilot age is a method of maintaining terrain features to the speed of the vehicle. Therefore, drivers must ensure that their vision is good enough to drive, (Fry, 1986) as cited by Ezebuirroh, (2006).

Most countries have regulating bodies which ensure that the driver meets the standard requirements before the issuance of license. The drivers and vehicle



licensing agency (DVLA) in the United Kingdom has defined the minimum visual field for safe driving as a field of vision of at least 120 degrees on the horizontal meridian and no significant field defect in the binocular field which encroaches within 20 degrees of fixation either above or below the horizontal meridian. The legal standard required for driving a private car or motor bike is to be able to read a number plate at 20.5m. Guidelines issued by DVLA suggest that this corresponds to between 6/9 and 6/12 vision on the snellen's chart and guidelines for the Royal college of ophthalmologist equate this to be about 6/10 vision. (DVLA, 1998). An investigation into the vision of most Nigerian drivers is therefore necessary for the safety of road users as no visual test/screening is done before the issuance of licenses. Just as reading in a literature society is important to the quality of life, so is driving in a society that depends on the vehicle for transportation. Visual impairment is much more prevalent in adulthood. (Aderamo, 2010)

### Visual acuity:

The correct visual acuity must at least be such that he/she has time to detect and react to obstacles, pedestrians' other vehicles and signs while moving at the maximum posted speed in day light and in darkness.

| Class of licences           | Recommended standard  |
|-----------------------------|---|
| Personal use                | Not less than 20/50 that is 6/15 with both eyes open and examined together.                                 |
| Taxi and commercial drivers | Not less than 20/40(6/12) with both eyes open and examined together. Worse eye not less than 20/200 (6/60). |

### Visual field standards:

| Class of license    | Recommended standard   |
|---------------------|--|
| Taxi and commercial | 120 degrees along horizontal meridian and 15 degrees continuous degree above and below fixation with both eyes open and examined together. |

### Statement of Problem:

This research is therefore aimed at answering the following questions:

- What is the distribution of the visual acuity of the commercial bus drivers?
- What is the number of commercial bus drivers with visual acuity defects?
- What is the distribution of visual field extent of the commercial bus drivers?
- What is the number of commercial bus drivers with visual field defects?

### Purpose of Study:

The aim of the study is

- To know the distribution of visual acuity defect amongst commercial bus drivers.
- To know the number of commercial bus drivers with visual field defects
- To know the percentage of commercial bus drivers that is visually eligible.

### Significance:

- The information gained from this study will enable the clinician to know the number of visual ineligible and visual eligible commercial bus drivers in the above named L.G.A.
- This may be a major milestone as it may help answer the question as to why the rate of road traffic accidents is still on the increase despite the strict rules by the government.
- Knowledge gained from this study will enable the clinician, optometrists' ophthalmologists and other health care professionals to advise their patients on safe driving as related to their visual health status.
- This research would create awareness amongst commercial bus drivers on the importance of regular visual screening exercise.
- Commercial bus drivers with visual acuity defects and visual field defects will pay more respect their limitations in driving.

### Limitations of the Study:

- Illiteracy of subjects (commercial bus drivers)
- Lack of co-operation on part of the commercial drivers because most refuse to give out information for fear of being dismissed by their employees.
- Language barriers leading to difficulty in communication
- Is tangent screen alone a specific /sensitive test?

### Methodology:

Research design: This research was conducted in four motor parks in Aba South L.G.A in Abia State. The research was designed to enable the clinician determine the relationship between visual acuity /visual field extent of commercial bus drivers and road traffic accidents in Aba south L.G.A and to suggest means of eliminating or reducing the occurrence of road traffic accidents in Aba south L.G.A

Study population: The target population of the research in Aba south L.G.A in Abia state are drivers who had at least 5 years of driving experience. This research examined 120 drivers from four different motor parks

Aba main Motor Park: 44 drivers

Abia line Motor Park: 21 drivers

Ochendo Motor Park: 26 drivers

York Street Motor Park: 29 drivers



### Data collection:

The exercise started with the presentation of a letter of permission from the head of the department of optometry of Abia state university to the directors of the motor parks.

Questionnaires were used to carry out the research. they contained the following information : age , driving experience ,if the driver has ever been involved in a car accident , case history , visual acuity of the patient aided ,unaided , and pinhole acuity at both far and near , visual field , ophthalmoscopic findings , if the driver had ever visited a clinic , if his vision was tested before driving license was issued.

### Instrumentation:

This includes snellen's visual acuity charts for both far and near, Bjerrum's tangent screen chart, ophthalmoscope.

### Testing procedures:

**Visual acuity:** With the driver seated on a chair placed in front of the snellen's distance acuity chart hung on a wall 6 meters away, the visual acuity was measured monocular with the examiner's right eye to the patient's right eye and vice versa . The clinician prevents direct nose to nose breathing.

**Visual field:** The drivers had their peripheral visual fields measured with Bjerrum's tangent screen chart. The screen 1-meter square placed at a distance from the patient.

A good way to begin the testing procedures is to map out the patient's blind spot, going from non-seeing to seeing, using a large white test object (5/10mm). This procedure is interesting to the patient and it provides an opportunity to check the speed and accuracy of responses. Once the blind spot has been grossly mapped out, a smaller test object (2 /3mm) is used to more accurately determine the limits of the blind spot and to check for any vertical extensions of the blind spot. During the testing procedure the patient should be instructed to fixate intently on the central fixation point and the examiner should be positioned so that constant checking can be done to be sure that the patient is fixating. If the patient wears glasses, they should be worn for tangent screen examination.

### Results:

#### Data analysis:

The data used for this research were collected from questionnaires and also eye examination, tables were used to summarise and analyse the data for the purpose of drawing conclusions.

#### Data Analyses:

A total of 120 drivers were examined. All of them were males between the age ranges of 25-77 years. The visual acuity of the drivers is classified according to the standard of the Driver and Vehicle Licensing Authority where a good visual acuity is from 6/6 to 6/12.

| Age range    | Good V.A  |           | Bad V.A   |           | Total      |
|--------------|-----------|-----------|-----------|-----------|------------|
|              | OD        | OS        | OD        | OS        |            |
| 28-37        | 9         | 12        | 5         | 2         | 28         |
| 38-47        | 18        | 14        | 6         | 8         | 46         |
| 48-57        | 22        | 22        | 20        | 24        | 88         |
| 58-67        | 12        | 16        | 15        | 13        | 56         |
| 68-77        | 3         | 8         | 7         | 4         | 22         |
| <b>Total</b> | <b>64</b> | <b>72</b> | <b>53</b> | <b>51</b> | <b>240</b> |

Table 4.1 shows the distribution of visual acuity according to age

| Driving experience | Good V.A  |           | Bad V.A   |           | Total      |
|--------------------|-----------|-----------|-----------|-----------|------------|
|                    | OD        | OS        | OD        | OS        |            |
| 5-20               | 48        | 28        | 27        | 49        | 152        |
| 21-36              | 15        | 18        | 18        | 15        | 66         |
| 37-52              | 5         | 6         | 6         | 5         | 22         |
| <b>Total</b>       | <b>68</b> | <b>52</b> | <b>51</b> | <b>69</b> | <b>240</b> |

Table 4.2 shows the distribution of visual acuity amongst drivers with driving experience

| Age range    | Good V.A  |           | Bad V. A  |           | Total      |
|--------------|-----------|-----------|-----------|-----------|------------|
|              | OD        | OS        | OD        | OS        |            |
| Yes          | 16        | 13        | 13        | 16        | 58         |
| No           | 51        | 40        | 39        | 52        | 182        |
| <b>Total</b> | <b>67</b> | <b>53</b> | <b>52</b> | <b>68</b> | <b>240</b> |

Table 4.3 shows the distribution of visual acuity and rate of road traffic accidents

The rate of road traffic accidents is 24.17%, the percentage of drivers with poor visual acuity is 50%, the rate of road traffic accidents caused by poor visual acuity is 15.84%

The visual field of the drivers is classified according to the visual standard of the Driver and Vehicle Licensing Authority

#### The distribution of visual field and driving experience:

| Driving experience | Full visual field | Constricted visual field | Total      |
|--------------------|-------------------|--------------------------|------------|
| 5-20               | 69                | 7                        | 76         |
| 21-36              | 25                | 8                        | 33         |
| 37-52              | 10                | 1                        | 11         |
| <b>Total</b>       | <b>104</b>        | <b>16</b>                | <b>120</b> |

The percentage of drivers with constricted visual field is 13.33%, the percentage of drivers with full visual field is 86.67%,

#### The distribution of visual field and rate of accidents:



| Accidents    | Full Visual field | Constricted visual field | Total      |
|--------------|-------------------|--------------------------|------------|
| Yes          | 19                | 10                       | 29         |
| No           | 80                | 11                       | 91         |
| <b>Total</b> | <b>99</b>         | <b>21</b>                | <b>120</b> |

The percentage of road traffic accidents caused by visual field defect is 8.33%

#### Test of Hypothesis one:

The clinician adopted chi-square method to run this analysis, and assumes 5% level of significance and some degree of freedom  
Computation of degree of freedom:

Ho: poor visual acuity is responsible for some of the road traffic accidents

Hi: poor visual acuity is not responsible for some of the road traffic accidents

| Accidents    | Good V.A  |           | Bad V.A   |           | Total     |
|--------------|-----------|-----------|-----------|-----------|-----------|
|              | OD        | OS        | OD        | OS        |           |
| Yes          | 16(16.19) | 13(12.81) | 13(12.57) | 13(12.81) | 58        |
| No           | 51(50.81) | 40(40.19) | 39(39.43) | 52(51.57) | 182       |
| <b>Total</b> | <b>67</b> |           | <b>53</b> |           | <b>68</b> |

Table 4.6 is gotten from table 4.3

From the above table and analysis, we accept the null hypothesis and conclude that poor visual acuity is not responsible for some of the road traffic accident

#### Test of hypothesis two:

Ho: poor visual field is not responsible for some of the road traffic accidents.

Hi: poor visual field is not responsible for some of the road traffic accidents.

| Accident     | Full visual field | Constricted visual field | Total      |
|--------------|-------------------|--------------------------|------------|
| Yes          | 19(23.93)         | 10(5.08)                 | 29         |
| No           | 80(75.08)         | 11(15.93)                | 91         |
| <b>Total</b> | <b>99</b>         | <b>21</b>                | <b>120</b> |

Table 4.7 From the above analysis and table, we accept the null hypothesis and conclude that poor visual field is not responsible for some of the road traffic accidents.

#### Discussion:

##### Discussion of Findings and Conclusion:

This study was carried out to assess the visual acuity and visual field of commercial bus drivers in Abia state, Nigeria where 120 commercial bus drivers were tested within age ranges of 25-77 years. This falls within

the range of a survey of 180 taxi drivers carried out in Benin City, Nigeria by Wole (1981), 31.7% of the bus drivers were found to have poor visual acuity and they are between 27 and 38 years but the rate was higher amongst drivers over 35 years. They emphasized that the correction of poor visual acuity is a way of reducing the incidence of road traffic accidents.

At the time of this research it was found out that a greater percentage (68.33%) of the drivers had never visited an eye clinic to for an eye examination, while (31.67%) of the drivers had visited an eye clinic for an eye examination. Also, most of the drivers didn't have an eye screening before their driving license was issued (71.67%).

This has raised a great concern on the visual state of the drivers despite the legal conditions stated by the road safety commission in Nigeria to reduce road traffic accidents. Most of the drivers also have a carefree approach towards their visual status. This is as a result of poor emphasis of visual standards in the occupational visual task.

The visual acuity of the drivers was classified according to the visual standards stated by the driver and vehicle licensing authority (DVLA) in the United Kingdom. The commercial driver should have a visual acuity of 6/6 to 6/12. It was found out that at least 50% of the drivers' population had good visual acuity of 6/6 to 6/12; this could be responsible for the low rate of road traffic accidents in Abia south local government area. This corresponds with the studies of Oladehinde *et al*, 2007 (96.7%), Maliza, 2010 (93.3%) and Omolase *et al*, 2012 (97.8%).

The visual field of the drivers was also classified based on the visual standards of driver and vehicle licensing authority in the United Kingdom. It was found out that 86.67% of the drivers had a full visual field while 13.33% of the population had constricted visual fields. However, 8.33% of the drivers with constricted visual fields had road traffic accidents. There was no significant relationship between road traffic accidents and visual field though it could be responsible for a lesser percentage of the road traffic accidents in the local government area. In a similar study by Owsley *et al* (1998) and Ball *et al*, (1993) visual field defect was implicated in risk of road traffic accidents.

In the course of this research, it was observed through ophthalmoscopic findings some of the drivers had cataract which caused temporary monocular blindness and some had retinopathies though it was a lesser percentage and it was also observed that some of these drivers with these pathological problems had never had an eye examination. This is similar to a research carried out by Emerole *et al*, 2006 in Owerri, Nigeria. Prevailing eye conditions like pterygium (51.3%), Retinopathy (16.7%), Glaucoma (12.0%) and Alcohol consumption (64.7%) which has an effect on glare and contrast sensitivity which could directly have an effect on visual acuity. In this work it was also observed that a greater percentage of the drivers were alcoholics and chain smokers. This could lead to severe itching, cataract formation, age related macular degeneration. (Kerstan, 2007)

#### Conclusion:

The result of the analysis is as follows:

- 50% of the drivers had good visual acuity.
- 50% of the drivers had poor visual acuity
- 86.67% of the drivers had full visual field
- 13.33% of the drivers had constricted visual field
- The rate of road traffic accidents was 24.17%
- 31.67% of the drivers have had an eye examination





- 68.33% have never had an eye examination
- 28.33% had an eye screening before a driving license was issued to them.
- 71.67% of the drivers got a license without an eye screening
- 8.33% of road traffic accidents in the local government was caused by constricted visual fields
- 15.84% of the road traffic accidents were caused by poor visual acuity
- 

#### Recommendations:

- The Nigerian government should implement a standard visual acuity and visual field extent for commercial bus drivers.
- Strict health rules should be implemented for commercial bus drivers to reduce the incidence of glare and contrast sensitivities, and retinopathies caused by high alcohol consumption and smoking.
- A regular eye examination should be conducted for commercial bus drivers at least once every year to know the state of their visual status and before driving license is renewed.
- Optometrists should always keep their patients informed on their visual status especially drivers and those that are not visually eligible should be advised to stop driving.
- Drivers within the age range of 65 to 77 years should be subjected to a compulsory visual assessment to take care of age-related changes in the eye.
- Seminars on ocular health of drivers should be organised for commercial bus drivers to educate them on the importance of vision in driving and how to maintain a healthy eye.

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