*Original Research Article*

# Prevalence and Pattern of Visual Impairment among Adult Population in Mangu Local Government Area of Plateau State, Nigeria


**ABSTRACT**

Aim: Visual impairment is a public health problem globally. This study aimed to determine the prevalence and pattern of visual impairment among adult population in Mangu Local Government Area (L.G.A), Plateau State, Nigeria.

Study Design: A population-based descriptive cross-sectional survey of 802 adult population aged 18 years and above was conducted in Mangu L.G.A, Plateau State, Nigeria using a multi-stage cluster random sampling design.

Methodology: Subjects were evaluated using a magnifying loupe, Snellen E chart, direct ophthalmoscope and torchlight. Vision status was defined using World Health Organization categories of visual impairment based on presenting visual acuity (VA).

Results: Out of a total of 960 respondents enumerated for the study, 802 (83.5%) adults participated. Prevalence of blindness (presenting VA of less than 3/60 in the better eye) was 8.1%; prevalence of low vision (presenting VA of at least 3/60 but less than 6/18 in the better eye) was 27.6%; prevalence of overall visual impairment (presenting VA less than 6/18 in the better eye) was 35.7%. Prevalence of visual impairment was higher in males (40.8%) than in females (34.9%), although not statistically significant (p=0.098). Prevalence of blindness and impaired vision increased significantly with increasing age, from 21.7% at 20 - 39 years to 83.6% among those aged ≥80 years (P < 0.001).

Conclusion: Much can be done by individuals, governments and non-governmental organizations to reduce so much blindness and vision loss through cost-effective interventions such as wears of sunglasses and other preventive measures to prevent ultraviolet radiation effect on their eyes.



*Keywords: Visual Impairment, Blindness, Prevalence, Cataract, Refractive Error*

## 1. INTRODUCTION

The eyes being the most delicate organs of the body and an organ of sight make it to be revered by the totality of mankind. Its importance cannot be overemphasized. Good and proper functioning of the eyes correlates with an individual's ability to function independently, perform activities of daily living, and/or travel safely through the environment. [1], [2] Good visions in adults are concerned with securing and maintaining employment, promoting productivity, and fulfilling family and social obligations [3]. Visual impairment is a global health problem that result in loss of the ability to read standard-sized print, inability or limitation with respect to driving, difficulty performing work-related tasks or leisure activities, and/or inability to recognize faces of familiar people, and limitation of personal or socioeconomic independence [1], [4]. Nevertheless, the common causes of visual acuity (VA) loss as reported in other studies were uncorrected refractive errors, cataract, central corneal opacities, and retinal diseases. Cataract, corneal opacity, and glaucoma were the main causes of blindness and low vision in the population aged 50 years or more as shown in figure 1 [5].

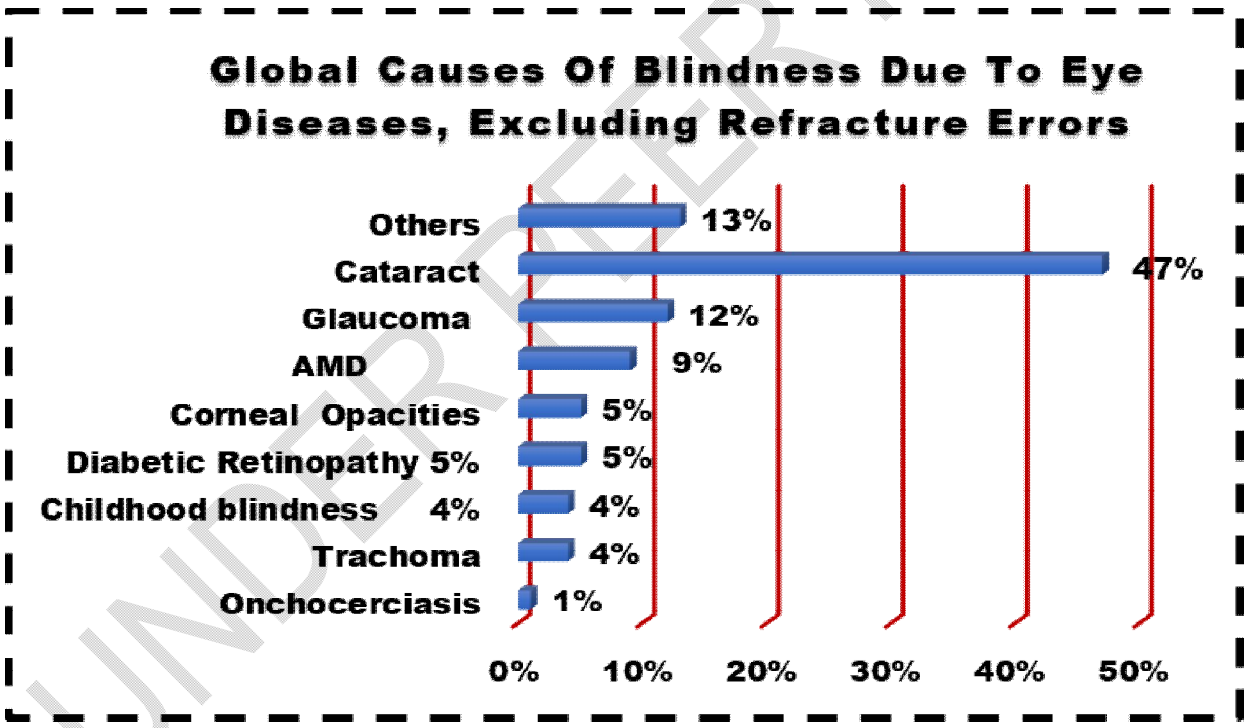


**Fig 1. Global causes of blindness due to eye diseases excluding refractive errors.**[5]

It is absolutely important to delve a bit into what the word impairment or blindness actually means. Traditionally, the definitions of blindness have fallen into two categories: functional definitions based on disability and definitions based on the measurement and quantification of VI (visual acuity [VA] and visual field) [6]. However, in 1948, the WHO Expert Committee on Health Statistics endorsed two definitions of blindness. The first was the

measurement-based definition which was a central VA of 20/200 or worse with the best correcting lens or a field defect, in which the field has contracted to such an extent that the widest diameter of visual field subtends an angular distance no more than 20°. Secondly, the disability-based functional definition alluded to “economic blindness” which meant the inability to do any kind of work, industrial or otherwise, for which sight is essential. Both of these definitions were included in the first Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death [7]. But to have all-inclusive definitions, it pivotal to consider that the magnitude of blindness and the relative contribution of various causes have a direct effect on advocacy, allocation of resources, policymaking, and program planning hence the universality in the definition of blindness across various regions of the world is a prerequisite for facilitating the collection of population-based data on the prevalence of vision impairment and blindness in a uniform and comparable manner and estimating the global burden of blindness [8].

It is sequel to the above that it is worthy of note to state that visual impairment or blindness cast a very heavy burden on the individual, the economy and the world itself. No wonder report has it that the World Health Organization (WHO), alluded that visual impairment (VI) is an important health problem in both developed and developing countries and further stated that the estimated number of visually impaired people worldwide is 285 million, with 39 million being blind and 246 million having low vision. About 65% of visually impaired and 82% of blind people are 50 years and older, even though people in this age group represent only 19% of the world’s population.[9] However, vision loss can affect people of all ages. Globally, it has been estimated also that at least 2.2 billion people have a near or distance vision impairment. In at least 1 billion – or almost half – of these cases, vision impairment could have been prevented or has yet to be addressed, the leading causes of vision impairment and blindness are uncorrected refractive errors and cataracts. Finally, vision impairment poses an enormous global financial burden with the annual global costs of productivity losses associated with vision impairment from uncorrected myopia and presbyopia alone estimated to be US$ 244 billion and US$ 25.4 billion [10].

Despite the WHO global initiative for the elimination of avoidable blindness (known as “vision 2020: The Right to Sight”) aimed to ultimately reduce prevalence of visual impairment to less than 0.5% in all countries, or less than 1% in any country,[11] available data published by WHO estimated that northern Nigeria has a near three-fold higher prevalence of blindness than the south (1.5%:0.5%) [12]. However, visual impairment has not received the desired attention in spite of the fact that it leads to social dependence, loss of productivity as well as income and economic collapse especially in developing countries [1].

Church of Christ in Nations (COCIN) Leprosy rehabilitation centre (a missionary hospital) is the only health facility with miniature eye care unit within the Mangu local government area (LGA) to serve the teeming population in that

section of Plateau State, Nigeria. Both the facility and man power could be over stretched resulting in poor quality of eye care delivery. Other eye care centres present in Plateau state are located in the state capital metropolis (Jos) which is about 120km/hr away from the study area. The distance, transportation and high cost of treatment may contribute to increase in the prevalence of visual impairment. There is gap in knowledge regarding the actual prevalence of visual impairment in Mangu LGA. This study investigated the prevalence and pattern of visual impairment in adult population of Mangu LGA, Plateau State, Nigeria in order to develop strategies for solving identified prevailing eye problems as well as facilitate planning and resource allocation to ameliorate visual impairment.

## 2. MATERIAL AND METHODS

### 2.1 Study design and ethics

The study was a population based descriptive cross-sectional study of adult population in Mangu L.G.A. the study was carried out in accordance with the code of ethics of the World Medical Association (Declaration of Helsinki), and ethical clearance was obtained from the Research and Ethic Committee of the University of Jos Teaching Hospital, Jos, Plateau State. Permission was also taken from the chairman of Mangu local government council as well as from the District head of the various villages. Informed consent was obtained from all participants or guardians after detailed explanation of the study procedure was done in both local dialects and English Language. Confidentiality of the information collected was assured to the respondents.

### 2.2 Study subjects and sampling procedure

The study population comprised of adults in Mangu LGA aged 18 years and above. Mangu is a Local Government Area in Plateau State, Nigeria. Its headquarters are in the town of Mangu at 9°31′00″N 9°06′00″E. It has an area of 1,653 km² and a population of 294,931 at the 2006 census [13].

A multi-stage cluster random sampling technique was used to sample respondents for this study. There are eight (8) political districts comprising of 36 villages in Mangu L.G.A. In the first stage, four districts were randomly selected using random numbers generated from Microsoft excel. The four districts were Gindiri District (4 villages), Kerang District (2 villages), Mangu District (8 villages), Payam District (4 villages), making a total of 18 villages. In the second stage, 16 villages from the four districts were surveyed. Two villages could not be surveyed due to security challenges from Fulani herdsmen. In the third stage, every household in each village (cluster) were numbered to make a sample frame. 20 households were randomly selected from each village (cluster) using random number generated from the sample frame, giving a total of 320 households. In the fourth stage, 3 adults aged 18 years and above were randomly selected from each household. In household where adult

is less than 3, neighbouring household with greater than 3 adults were used to make up for such households. 60 eligible respondents were recruited from the 16 villages making a total of 960 eligible individuals enumerated from the four districts. All enumerated participants were directed to the primary health centre (or community town hall in the absence of PHC) for data collection and comprehensive clinical examination. An attempt was made to examine absentees by returning to households in which persons were absent on the day of the survey. Households in which all residents were not available were skipped. The process resulted in the enumeration of 960 respondents across the 4 randomly selected districts in Mangu Local Government Area.

## 2.3 Procedure

### 2.3.1 Training of Research Assistants

Two teams each comprising of one optometrist, two ophthalmic nurses, and one community health extension worker (CHEW) conducted the surveys. In each team, the community extension worker was trained to administer the questionnaire as well as to collect demographic information of each respondent. One of the ophthalmic nurses was in charge of taking the visual acuity and tonometry for the respondents, while the other ophthalmic nurse was in charge of taking the blood pressure, fasting blood glucose and the body mass index of the respondents. The optometrist carried out visual examination and refraction on each respondent. In situations where cause of visual impairment cannot be ascertained, the Optometrist referred such respondent to the ophthalmologist in COCIN Rehabilitation centre, Sabon Lahi, Mangu for final verdict on the diagnosis. Two-day training of research assistants was done, and a pilot study were conducted in a nearby non selected community to familiarize the teams with the instruments and procedures for the survey. A sample of 30 respondents was randomly selected for the training.

### 2.3.2 Administration of Questionnaires

Social and demographic data of all selected participants that gave consent were collected using self-administered structured questionnaire. Demographic data collected at the household enumeration interview included; age, sex, Occupation, Religion, level of Education, family size, marital status, housing unit, Source of drinking water, smoking status, and average monthly income.

### 2.3.3 Ocular Examination

Trial lens set, retinoscope, distance snellen letter and illiterate E charts were used to measure the visual acuity as well as determine the refractive status of each selected participants. Pen torch and ophthalmoscope were used to examine the external and internal integrity of the eyes respectively. Schiotz tonometer was used to measure the intraocular pressure of the eye.

### 2.4 Data Analysis

All data collected were entered into IBM SPSS version 20.0 software for data analysis. Data analysis was performed using Chi square test. Relationship between prevalence of visual impairment and sociodemographic factors such as age, gender, occupation, income, marital status, religion e.t.c were done using Chi square test. Fisher's exact test of chi square test was used whenever the count of sample in a cell is less than 5. All p values reported are two tailed and significance is defined as *P = .05*.

## 3. RESULTS AND DISCUSSION

### 3.1 RESULTS

A total of 960 respondents were enumerated for the study, but 802 (83.5%) adults participated in it. This comprises of 277 (34.5%) male and 525 (65.5%) female. The mean age of the 802 subjects was 51.6±17.4 (standard deviation) years.

Table 1 shows that a higher proportion of the respondents were in the age group 40 – 59 years with a mean (standard deviation) age of 51.6 (17.4) years. There were more female 525 (65.5%) than males with about half 405 (50.5%) of the respondents having no formal education. A majority 552 (68.8%) of the respondents were employed, married 628 (78.3%), and Christians 488 (60.8%). More than one-fourth of the respondents earn below 18,000 naira while majority 709 (88.4%) of the respondents had never smoked. More than half 456 (56.9%) of the respondents reside in two-bedroom housing units, and had family sizes of seven and above. Their main source of water is well; 309 (38.5%), followed by piped water; 253 (31.5%). One hundred and sixteen (41.9%) of the male respondents had impaired vision, compared to 170 (32.4%) of the female respondents. The association between sex and impaired vision was statistically significant ($\chi^2$=7.345, df=1, *P=.008*). Twenty-five (17.6%) of the respondents in the age group 20 – 39 years had impaired vision, compared to 86 (25.6%) of those in the age group 40 – 59 years and 106 (58.6%) of those in the age group 60 – 79 years. The association between age and impaired vision was statistically significant ($\chi^2$=158.693, df= 4, *P<.001*).

One hundred and seventy eighty (44.1%) of the respondents with "no formal education" had impaired vision, compared to 37 (30.1%) of those with primary education, and 41 (22.9%) of those with secondary education. The association between educational level and impaired vision was statistically significant ($\chi^2$= 26.973, df= 3, *P<.001*).

One hundred and ninety-six (35.6%) of the respondents who were employed had impaired vision, compared to 90 (35.9%) of those who were unemployed. The association between employment status and impaired vision was not statistically significant ($\chi^2$= 0.016, df= 1, *P=.936*).

Sixteen (24.6%) of the respondents who were single had impaired vision, compared to 211 (33.8%) of those who were married, and 12 (42.9%) of those who were divorced/separated. The association between marital status and impaired vision was statistically significant ($\chi^2$= 20.407, df= 3, *P<.001*). One hundred and seventy (34.8%) of Christians had impaired vision, compared to 124 (40.3%) of those who were Muslims. The association between religion and impaired vision was not statistically significant ($\chi^2$= 5.921, *P=.136*).

Ninety-two (40.2%) of the respondents who earn less than 18,000 naira had impaired vision, compared to 66 (34.6%) of those who earn 18,000 to 50,000 naira. The association between income earnings and impaired vision was not statistically significant ($\chi^2$= 0.176, *P=.176*).

Eighteen (40.0%) of the respondents who were current smoker had impaired vision, compared to 20 (41.7%) of those who were former smoker, and 258 (36.4%) who were never smokers. The association between smoking status and impaired vision was not statistically significant ($\chi^2$=1.023, df= 2, *P=.354*).

One hundred and eleven (38.1%) of the respondents with household size of 1 – 6 had impaired vision, compared to 175 (34.2%) of those with family size seven and above. The association between household size and impaired vision was not statistically significant ($\chi^2$=0.117, df= 1, *P=.776*).

**Table 1: Socio-demographic characteristics by visual impairment among respondents**

| Variables | Normal vision n = 516 (%) | Impaired vision n = 286 (%) | P-value* |
|---|---|---|---|
| Age group (years) | | | |
| <20 | 16 (64.0) | 9 (36.0) | <.001 |
| 20 – 39 | 117 (82.4) | 25 (17.6) | |
| 40 – 59 | 295 (77.4) | 86 (25.6) | |
| 60 – 79 | 75 (41.4) | 106 (58.6) | |
| 80+ | 13 (17.8) | 60 (82.2) | |
| Sex | | | |
| Male | 161 (58.1) | 116 (41.9) | .008 |
| Female | 355 (67.6) | 170 (32.4) | |
| Level of education | | | |
| No formal education | 226 (55.9) | 178 (44.1) | <.001 |
| Primary | 86 (69.9) | 37 (30.1) | |
| Secondary | 138 (77.1) | 41 (22.9) | |

| | | | |
|---|---|---|---|
| Tertiary | 66 (68.8) | 30 (31.2) | |
| Employment status | | | |
| Employed | 355 (64.4) | 196 (35.6) | .936 |
| Unemployed | 161 (64.1) | 90 (35.9) | |
| Household size[ϰ] | | | |
| 1 – 6 | 180 (61.9) | 111 (38.1) | .776 |
| 7+ | 336 (65.8) | 175 (34.2) | |
| Marital status | | | |
| Single | 49 (75.4) | 16 (24.6) | <.001 |
| Married | 413 (66.2) | 211 (33.8) | |
| Divorced/separated | 16 (57.1) | 12 (42.9) | |
| Widowed | 38 (44.7) | 47 (55.3) | |
| Religion | | | |
| Christianity | 318 (65.2) | 170 (34.8) | .136[+] |
| Islam | 184 (59.7) | 124 (40.3) | |
| ATR | 1 (100.0) | 0 (0.0) | |
| Others | 3 (60.0) | 2 (40.0) | |
| Income per month (N) | | | |
| <18,000 | 137 (59.8) | 92 (40.2) | .176[+] |
| 18,000-50,000 | 123 (65.4) | 65 (34.6) | |
| 51,000-100,000 | 17 (81.0) | 4 (19.0) | |
| >100,000 | 4 (80.0) | 1 (20.0) | |
| None response | 235 (65.5) | 124 (34.5) | |
| Smoking status | | | |
| Current smoker | 27 (60.0) | 18 (40.0) | .354 |
| Former smoker | 28 (58.3) | 20 (41.7) | |
| Never smoked | 451 (63.6) | 258 (36.4) | |

*Chi-square test, [+]Fisher's exact test, Median (interquartile range) = 9 (5 to 15)

In Table 2, about two-third 516 (64.3%) of respondents had normal visual acuity in the better presenting eye. 90 (11.2%) had mild impairment, 88 (11.0%) had moderate impairment, 43 (5.4%) had severe impairment and 65 (8.1%) of the respondents were blind.

**Table 2: Visual acuity assessment of the better eye of respondents**

| Variables | better eye VA<br>n = 802 (%) |
|---|---|
| Presenting Visual acuity | |
| <= 6/12 (Normal) | 516 (64.3) |
| < 6/12 – 6/18 (mild impairment) | 90 (11.2) |
| < 6/18 – 6/60 (moderate impairment) | 88 (11.0) |
| < 6/60 – 3/60 (severe impairment) | 43 (5.4) |
| < 3/60 – Light Perception (blindness) | 65 (8.1) |

Table 3 shows that over one-third of the respondents 286 (35.7%) were visually impaired. Low vision (total sum of mild, moderate and severe impairment) accounted for 27.6% (221) and Blindness accounted for 8.1% (65) of the respondents as shown graphically in figure 2.

**Table 3: Prevalence of visual impairment among the respondents**

| Diagnosis | Frequency (n = 802)* | Percent |
|---|---|---|
| Diagnosis (using visual acuity)* | | |
| Normal | 516 | 64.3 |
| Low (impaired) Vision | 221 | 27.6 |
| Blind | 65 | 8.1 |
| Visual impairment** | | |
| Yes | 286 | 35.7 |
| No | 516 | 64.3 |

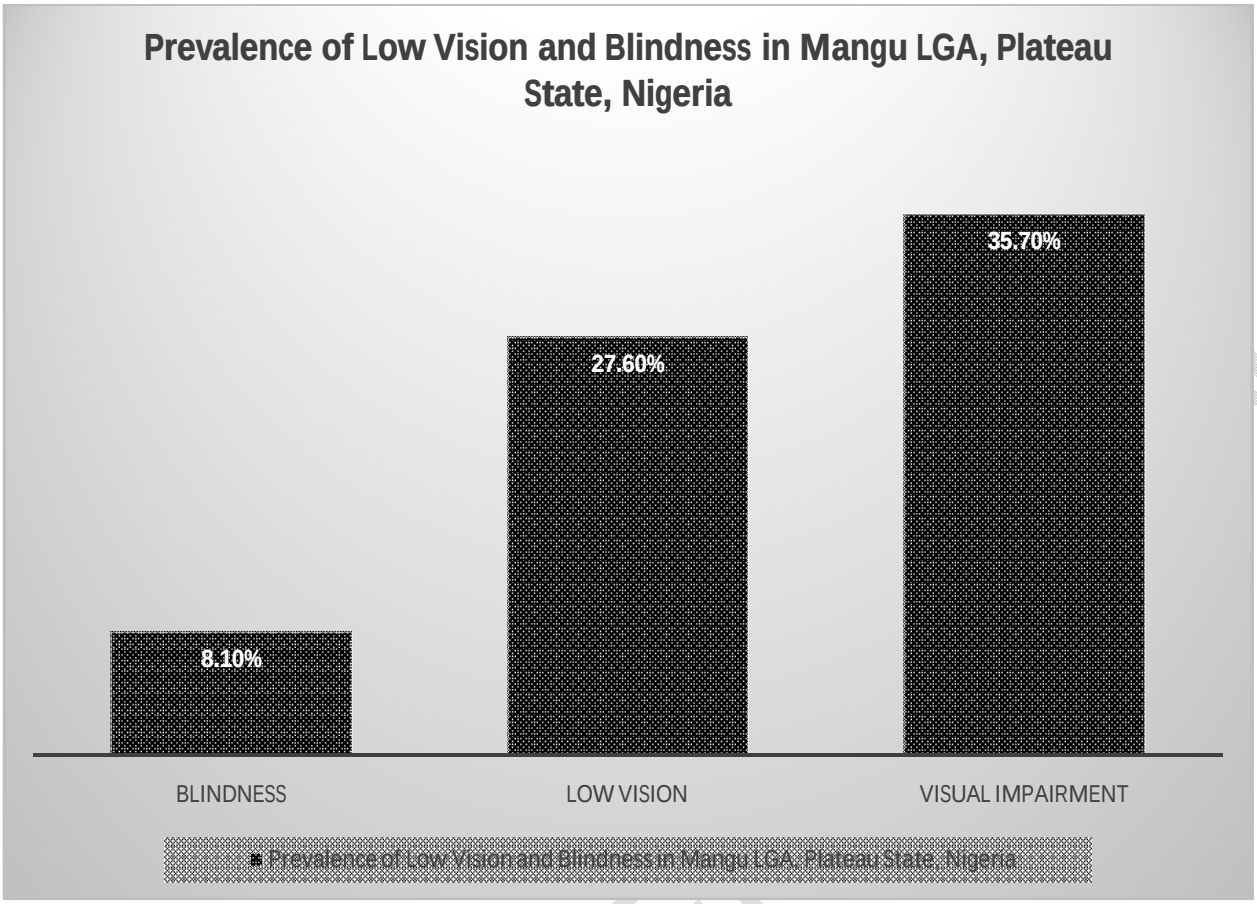


Figure 2: Prevalence of Low Vision and Blindness in Mangu LGA, Plateau State, Nigeria

In Table 4, the major causes of visual impairment among respondents were found to be cataract (10.2%), refractive error (8.4%), Glaucoma (7.0%), Age related macular degeneration (4.1%) and Diabetic retinopathy (2.1%).

Table 4: Prevalence of Causes of Visual Impairment among the Respondents

| Variables | Frequency (n = 802) | Percent |
|---|---|---|
| Cataract untreated | 82 | 10.2 |
| Refractive Error | 67 | 8.4 |
| Glaucoma | 56 | 7.0 |
| Age Related Macular Degeneration | 33 | 4.1 |
| Diabetic Retinopathy | 17 | 2.1 |
| Cataract Surgical Complication | 8 | 1.0 |
| Other Cornea Opacity | 5 | 0.6 |
| Other Posterior Segment | 5 | 0.6 |
| Aphakia uncorrected | 4 | 0.5 |
| Onchocerciasis | 4 | 0.5 |
| Trachoma Cornea Opacity | 3 | 0.4 |
| Phthisis bulbi | 1 | 0.1 |
| All Globe/CNS Abnormality | 1 | 0.1 |



### 3.2 DISCUSSION

A total of 802 (83.5%) out of 960 respondents participated in the survey. The prevalence of blindness and impaired vision in this study were 8.1% and 27.6% respectively, thereby making the total prevalence of visual impairment to be 35.7%.

This degree of visual impairment would not only affect the individual adversely, but also the family, the society and the economy of the nation at large. Such individual become dependent on family members and the society. They are disabled, handicapped, psychologically depressed, loss of dreams and aspiration and the result is low self-esteem and abject poverty to the immediate family, especially for the bread winner of the family. Since majority of the participants were farmers and civil servants, there would be reduction in man power resulting in

low productivity which could affect the economy markedly in terms of food production and income generation through taxes to the government. This prevalence was alarming and calls for immediate intervention by governmental and non-governmental organizations in order to intercept this trend by declaring emergency on eye care services. There should be immediate employment and deployment of eye care practitioners to all the primary health centres in the L.G.A as well as mobile outreach team to take eye care services to the remote communities. Otherwise, productivity, independence and efficiency will be hampered in both individual and the general public.

In a similar study carried out by Malu in Jos, Plateau State, the prevalence of visual impairment was found to be 29.4% as compared to 35.7% in this study [14]. Also in another study carried out in Jos by Odugbo et al, [15] the prevalence of blindness was 5.9% compared to 8.1% in this study. In northern Nigeria, a blindness prevalence survey done over ten years showed all age blindness prevalence of 1.14% [16]; while in persons 40 years and above the prevalence of blindness was 8.2% [17]. These similarities with previous studies give indication that the visual status of the people of Plateau state needs urgent attention.

In southern Nigeria the reported prevalence of blindness ranges from 0.9% [18] to 1.2% [19] in whole population surveys (Western, southern and Eastern part of Nigeria) [12], [20]–[22]. The reduction in prevalence of blindness in the south may be due to the presence of tertiary institutions where eye care practitioners are trained and majority of the practitioners reside in the south to provide eye care services to the populace either in public or private sectors. The prevalence of blindness and visual impairment in Mangu L.G.A (35.7%) was higher than the overall Prevalence of Blindness and Visual Impairment in Nigeria [23]. Prevalence of blindness (8.1%) in this study was also far higher than that found in Cameroun (1.1%-1.4%)[24], [25] and Kenya 2.0% [26]. This may be probably due to availability of ophthalmological services in various regions of the countries.

The higher prevalence of visual impairment in this study could be attributed to low level of Eye health care and education services, Malnutrition (nutrient and micronutrient) from poverty leading to dry eyes, xerophthalmia, cataract formation and poor ocular health physiology, poor water quality leading to filarial worm infection, lack of sanitation leading to high incidence of eye diseases as well as lack of trained eye care personnel and inadequate housing and income.

Visual impairment and Blindness were most prevalent among the farmers (31.9%), followed by daily labourer (16.3%) and the house wives (15.6%). This is in concordance with other study carried out in Jos, plateau state [14].

Sex distribution in this study showed greater inclination towards the male (40.8%) against the female (34.9%). This implies that men have higher chance of being impaired than women. Association between sex and impaired

vision was statistically significant (p=0.008). This higher prevalence in male may be as a result of the farming occupation of majority of the male respondents. Farming is an outdoor occupation which exposes farmers to ultraviolet radiation capable of inducing cataract, pterygium, and age-related macular degeneration and optic nerve atrophy. The significant difference in sex in relation to visual impairment is similar to studies carried out by Onakpoya et al [21] in a rural community in Osun State, Nigeria and Ramke et al in Timor-leste [27]. Contrary to the result of this study, significant differences were observed in relation to sex with females having a higher prevalence [15], [23]. Court right reported that 64% of the total numbers of blind persons older than 50 years globally were women [28].

Prevalence of blindness and impaired vision increased significantly with increasing age, from 21.7% at 20 - 39 years to 83.6% among those aged ≥80 years ($P < 0.001$). This is consistent with other study globally [12], [23], [29], [30]. It is also in accordance with WHO's report that prevalence of visual impairment increases with age and the estimate of blindness prevalence ranging from 0.1% in subjects age 55-60 years to 3.9% in subjects aged 85 years and above [31]. However, the age group <20 years (33.3%) in this study had higher prevalence than the age groups 20-39 years and 40-59 years. This may be probably due to the fact that persons aged <20 years form only small part of the population in the study. Dexterity resulting from ageing processes can prevent the elderly from participating in healthy activities thereby resulting in high prevalence of visual impairment [32]. Age is an important factor in the development of age-related disorders like cataract, refractive error and glaucoma and as such visual impairment [33], [34]. Although, most of the age-related disorders cannot be averted, they can be prevented to a large extent when detected and diagnosed early.

Literacy was a significant factor to visual impairment in this study. Respondents who had no former education had a higher prevalence of visual impairment compared with those who had former level of education ($P < 0.001$). This could result from the absence of higher education training centre as well as less emphasis on the importance of former education in the area of study. Illiterate do not need their eyes most of the time for small detail tasks such as reading, writing, sighting of sign post write up at distance e.t.c. Hence, gradual visual impairment cannot be easy noticed until appreciable loss occurs. This finding is consistent with other findings in Nigeria and abroad [15], [23], [29], [30].

This study also showed that there was association between visual impairment and marital status. Impairment was higher among the widowed, seconded by the divorce/separated, followed by the married and least in the singled. Psychological, physical, social and emotional well-being of an individual affects the level of vision. This is consistent with the study of Mahesh et al [35]. This was also in consonance with the study of Aemero et al in

Ethiopia that visual impairment was significantly higher in respondents with psychological distress compared with those with normal vision [36]. The higher rate of severe visual loss in patients with marital distress might significantly reduce the health-related quality of life of the patient and add to the disability of affected persons. Hence, secondary prevention of psychological marital distress in patients with visual loss is beneficial. However, further studies are needed to explain the mechanisms between visual impairment and marital distress. The leading causes of preventable visual impairment in the studied area were cataracts (10.2%), refractive errors (8.4%), glaucoma (7.0%), age-related macular degeneration (4.1%), and diabetic retinopathy (2.1%). This is in consonance with the study carried out by Hudu et al. in Jos North Local Government Area of Plateau State, Nigeria, [37], Nigeria Army Eye Centre, Bonny Cantonment Lagos, Nigeria, [38] as well as in other countries [39]–[42].

## 4. CONCLUSION

Visual impairment is a global health problem that result to loss of the ability to read standard sized print, inability or limitation with respect to driving, difficulty performing work-related tasks or leisure activities, and/or inability to recognize faces of familiar people, and limitation of personal or socioeconomic independence. However, despite the enormous public health burden of vision loss on individual, family, society and the nation, visual impairment has not received the required attention needed to ameliorate this burden especially in Plateau State, Nigeria where this study was carried out. Much can be done by the individuals, government and non-governmental organization to reduce such blindness and vision loss through cost effective interventions such as; wearing sun glasses and hat/ face cap by farmers to prevent ultraviolet radiation effect on their eyes, and seeking eye care early when abnormality is noticed.

To ameliorate the issues of visual impairment and blindness, vision rehabilitation is very effective in improving functioning for people with an irreversible vision impairment that can be caused by eye conditions such as diabetic retinopathy, glaucoma, consequences of trauma and age-related macular degeneration. Each eye condition requires a different, timely response. There are effective interventions covering promotion, prevention, treatment and rehabilitation which address the needs associated with eye conditions and vision impairment; some are among the most cost-effective and feasible of all health care interventions to implement. For example, uncorrected refractive error can be corrected with spectacles or surgery while cataract surgery can restore vision.

## CONSENT

Informed consent was obtained from all participants included in this study after detailed explanation of the study procedure both in English Language and local dialect.

## ETHICAL APPROVAL

Approval was granted by the research and ethic committee of the university of Jos teaching hospital, Jos, Plateau State (approval date; 19th October, 2015/ ref. no. JUTH/DCS/ADM/127/xix/6366). Permission was also taken from the chairman of Mangu Local Government Council as well as the district heads of the various villages. All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

Conference disclaimer:

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