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Original Article

The burden of blindness and visual impairment according to age and gender: A case study of Emohua local government area, Nigeria

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Abstract

Background: Visual impairment and blindness pose different degrees of public health and social problem among the different age groups and sex. The problems are worse in the developing countries due to ignorance and lack of adequate eye care services. Public information systems, epidemiological data, and funding for blindness programs are often lacking and have hampered comprehensive blindness control programs in the rural communities, a fact that underscores the importance of this study.

Aim: To estimate the burden of blindness and visual impairment according to age and gender in Emohua local government area (LGA), Nigeria.

Methods: A population-based descriptive cross-sectional study conducted between October 11, and November 29, 2014, in Emohua LGA. Three hundred and fifty-three inhabitants were recruited in the study through a multistage sampling method. Demographic data, detailed ocular examinations were recorded and analyzed using SPSS version 20.

Results: The study participants were 164 males and 189 females (male:female = 1:1.2). The prevalence of bilateral blindness is 1.4% (95% confidence interval [CI]: 0.78–2.5%) and unilateral blindness 2.5% (95% CI: 1.2–3.4%). Those who had various degrees of visual impairment in both eyes constituted 6.2% (95% CI: 5.7–8.5%) and 9.1% had unilateral visual impairment (95% CI: 8.7–9.7%). Cataract was the leading cause of bilateral blindness, accounting for 60% of cases, glaucoma (20%), and corneal opacity (20%).

Conclusion: Blindness and visual impairment are more common in the older age groups and female gender in Emohua LGA. Government and nongovernmental organizations should step up comprehensive eye health care programs to realize the goals of Vision 2020.

Keywords: Blindness, burden, Emohua local government area, visual impairment

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Introduction

According to 2005 estimate, the number of people with visual impairment (which includes both low vision and blindness) is 314 million worldwide; 45 million people are blind while 269 people live with low vision.[1] Ninety percent of the world's blind population live in developing countries, out of which about 1.2 million people live in Nigeria.[2,3] The Nigerian national blindness and visual impairment survey in 2007 estimated that 1,092,028 Nigerians (0.78%) are blind.[4] This

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places a huge public health and socioeconomic burden on the populace, often leading to social dependence, lack of access to education, loss of productivity, and income.

It has been estimated that 60% of blind people are women.[5,6] In a population-based study in India by Venkata *et al*.,[7] it was observed that more than half of the visually impaired (52.7%) were women; 46.9% were aged 50–59 years, 33.8% were aged 60–69 years, and 19.3% were aged 70 years and above. In all, 71% were illiterate, and 84.6% were residing in rural areas. The sex distribution of glaucomatous blindness revealed that more females were affected than their male counterparts.[8]

The prevalence of blindness in India was associated with age, sex, literacy, place of residence, and working status; people aged 70 years and above had a five times higher risk of being blind compared to those aged 50–59 years and females had a marginally higher risk.[7]

In another population-based, cross-sectional study involving 3850 subjects aged 40 years and above from Chennai city in India, the prevalence of blindness was 0.85% and was positively associated with age and illiteracy.[8] The prevalence of blindness and visual impairment was found to be much higher in the elderly and most of the people bilaterally blind were 45 years of age and above.[9] In Pakistan, a nationally representative sample of 16,507 adults using multistage, stratified, cluster random sampling survey revealed that prevalence varied throughout the country, being highest in the rural areas than urban areas. Increasing age and being female were significantly associated with blindness.[10]

In Nigeria, Abdull *et al*.[4] observed that increasing age was associated with increasing prevalence of all major blinding conditions. Furthermore, in this study, females, illiterate persons, and residents in the Northeast geopolitical zone had significantly higher odds of cataract-induced blindness and severe visual impairment. In another study in Nigeria involving 15,122 persons aged 40 years and above, Kyari *et al*.[2] observed that the prevalence of blindness and severe visual impairment (visual acuity [VA] on presentation) was 4.2% (95% confidence interval [CI]: 3.8–4.6%) and 1.5% (95% CI: 1.3–1.7%), respectively. Blindness was associated with increasing age, being female, poor literacy, and residence in the North. Participants residing in the Southwest had the lowest prevalence while those in the Northeast had the highest prevalence of blindness. It is estimated that 4.25 million adults aged ≥40 years have moderate to severe visual impairment or blindness in Nigeria.[2]

Cataract, trachoma, uncorrected refractive error, onchocerciasis, childhood blindness, glaucoma, and diabetic retinopathy are the identified the leading causes of blindness worldwide.[3] In Nigeria, the major blinding diseases are cataract, glaucoma, corneal diseases, trachoma, onchocerciasis, and ocular trauma.[2] This is similar to the situation in other developing countries.[6,11]

In Southeastern Nigeria, Ezegwui *et al*.[12] observed the varying causes of blindness in children depending on the anatomical structure of the eye that was primarily involved. According to the study, the major causes of visual impairment identified in the children (aged 15 years or less) were lesions of the lens (30.4%), corneal lesions (21.7%), whole globe lesions (mainly phthisis bulbi) (17.4%), and glaucoma/buphthalmos (10.9%). For all the students (more than 15 years), these lesions accounted for 31.9%, 21.3%, 23.4%, and 8.5% of visual impairment, respectively. For all the students, the most common single diagnoses were cataract (23.5%) and corneal scarring (21.4%), of which 86.7% were caused by measles. By etiological classification, childhood factors (38.6%) constituted the major cause of blindness: 37.0% in the children and 39.4% in the young adults. In 74.5% of all the students, blindness was considered avoidable.

The World Health Organization (WHO) Program for the Prevention of Blindness (PBL) established in 1978 has definite objectives of making essential eye care available to all and to eliminate avoidable blindness.[3] The target of WHO Program for PBL is to reduce blindness rates to <0.5% in all countries and <1% in individual countries.[3] This is possible if all major blinding eye diseases are detected early and treated or even prevented from occurring. The aim of this study was to estimate the burden of blindness and visual impairment according to the age and gender in Emohua local government area (LGA), Nigeria.

Materials and Methods

This was a population-based, descriptive cross-sectional study conducted between October 11, and November 29, 2014, in Emohua LGA of Rivers State, Nigeria. Ethical approval for the study was obtained from the Research and Ethics Committee of the University of Port Harcourt Teaching Hospital, Port Harcourt.

Three hundred and fifty-three residents of Emohua LGA who verbally consented to ocular examinations were recruited in the study through a multistage sampling method. Consent was also obtained from family heads/chiefs on behalf of children <18 years. The subjects were told that participation was absolutely voluntary, that they could withdraw from the screening exercise at any point in time without victimization and that the survey will be free of charge.

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The 14 wards in the LGA formed the sampling frame. Eight wards (>50%) were randomly selected by a simple random method. In the second stage of sampling, one village per ward was also selected by the simple random method. In the third stage, households were further selected by the simple random method. Already numbered houses by health-care workers for immunization purposes were used for the selection of households as well as for monitoring purposes. The final stage of sampling involved the selection of individuals from the selected households. Eligible persons from the households were recruited and gathered at their various community halls for medical examination between the hours of 8 am and 5 pm each day for 8 weeks. When a selected house was locked, and eligible subjects absent repeat visits were made the same day. When contact could not be established after two visits; the household was categorized as a nonresponding and the nearest household was automatically recruited for the study. Where two households were equidistant, the one to the right was selected.

Basic eye examinations (which included checking the eyelids for trichiasis, globe for phthisis, cornea for opacity or pterygium, and lens for obvious opacity). Special eye examination with pen torch for cornea opacities, pupil for pupillary light reaction, and lens for any visible opacities. The anterior chamber depth was also assessed using pen torch. Fundoscopy was carried out with direct ophthalmoscope in a chosen dark area. The state of the lens, vitreous, retina, and optic nerve was assessed in details with direct ophthalmoscope. Where small pupils prevented good view of the fundus, dilatation with mydriacyl 0.5% was employed after refraction and measurement of the intraocular pressure (IOP).

Objective refractions were done in a darkened area with streak retinoscope and then subjectively refined by the optometrist. IOP measurement was done using Perkins applanation tonometer (MK2-model), after instilling local anesthetic agent (1% of tetracaine), and fluorescein dye into the conjunctival sac. IOPs were measured in both eyes three consecutive times. The measurements were done with the subjects in sitting position. The mean IOP value was adopted. All the measurements were carried out by the lead investigator to avoid interobservers' errors.

Presbyopic corrections-glasses (readers) were given to deserving subjects while those requiring further management and surgery were referred to University of Port Harcourt Teaching Hospital. Minor ocular ailments such as conjunctivitis were treated on the spot. Subjects with prolonged dilated pupils were treated with topical pilocarpine and reassured before going home. The WHO/PBL Eye Examination Record was used to record the data of subjects. All data were analyzed using SPSS version 20 (IBM Corporation USA, Chicago, Illinois, USA). Results were presented in tables and charts. Chi-square tests were performed between categorical variables to determine their level of statistical significance. A p-value of 0.05 or less is accepted as statistically significant.

Working definitions

- Blindness: VA <3/60 on presentation or corresponding visual field <10° in the better eye on presentation
- Visual impairment: Is defined as VA on presentation of <6/18 in the better eye but better than 3/60
- Glaucoma: Optic neuropathy associated with cupping of the optic disc (cup/disc ratio >0.5) and/or raised IOP (>21 mmHg) using Perkins applanation tonometer.

Results

The age group 45–54 years had the highest population of those examined (30.3%) while those of 15–24 years (2.0%) constituted the least. Participants of 45 years and above (238) constituted more than half of the survey population [Table 1].

Out of 353 participants examined, males were 164 (46.5%) while females constituted 53.5% (189). This gives a male to female ratio of 1: 1.2.

A total of 27 persons were either bilaterally blind or bilaterally visually impaired while 41 were either unilaterally blind or unilaterally visually impaired as shown in Table 2. This gives a total of 68 persons with various categories of the ocular problem (blindness and visual impairment). Prevalence of bilateral blindness in the survey was 1.4%, unilateral blindness was 2.5%, bilateral visual impairment was 6.2%, and unilateral visual impairment was 9.1%.

Cataract was the leading cause of bilateral blindness, accounting for 3 (60%) cases. Other causes were glaucoma 1 (20%) and corneal opacity 1 (20%) as shown in Figure 1.

Cataract was also the leading cause of unilateral blindness 4 (44.5%), followed by glaucoma 3 (33.3%), corneal opacity 1 (11.1), and pterygium 1 (11.1%) [Figure 2].

The leading cause of bilateral visual impairment was refractive error 12 (54.6%), followed by cataract 5 (22.7%),

Table 1: Age and gender distribution of the sample population

Age group (years)	Male (%)	Female (%)	Total (%)
15-24	6 (1.7)	1 (0.3)	7 (2.0)
25-34	9 (2.5)	13 (3.7)	22 (6.2)
35-44	32 (9.1)	54 (15.3)	86 (24.3)
45-54	55 (15.6)	53 (15.0)	108 (30.6)
55-64	27 (7.7)	27 (7.7)	54 (15.3)
65-74	29 (8.2)	33 (9.3)	62 (17.6)
75 and above	6 (1.7)	8 (2.2)	14 (4.0)
Total	164 (46.5)	189 (53.5)	353 (100)

Table 2: Blindness and visual impairment in study population

Categories of visual impairment	Number of persons (bilateral)	Prevalence (%) (bilateral)	Number of persons (unilateral)	Prevalence (%) (unilateral)
Blindness (VA<3/60 – NLP)	5	1.4	9	2.5
Visual impairment category I (VA<6/18≥6/60)	16	4.5	18	5.1
Visual impairment category II (VA<6/60≥3/60)	6	1.7	14	4.0
Total	27	7.6	41	11.6

VA: Visual acuity, NLP: No light perception

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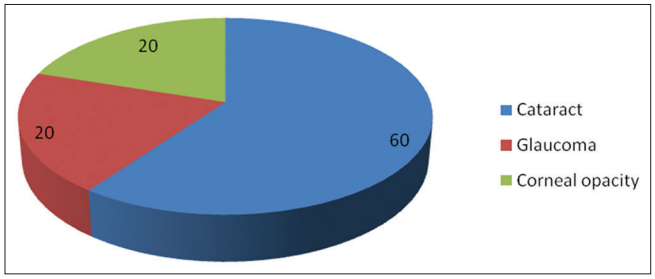

Figure 1: Causes of bilateral blindness (%)

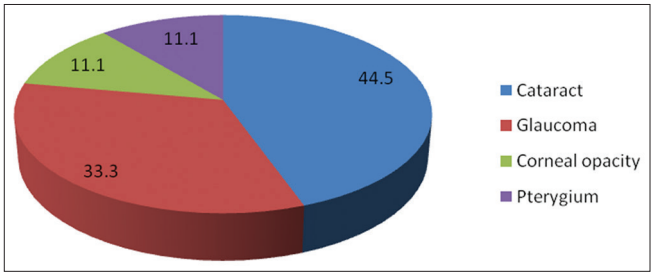

Figure 2: Causes of unilateral blindness in percentage

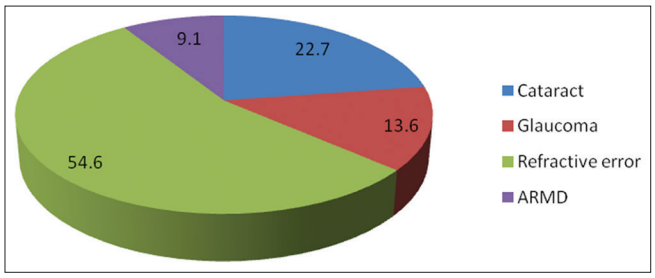

Figure 3: Causes of bilateral visual impairment (%)

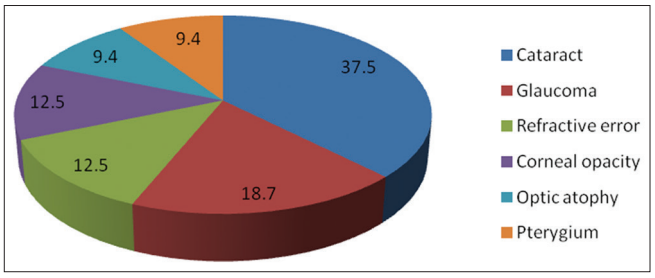

Figure 4: Causes of unilateral visual impairment (%)

glaucoma 3 (13.6%) and age-related macular degeneration 2 (9.1%) [Figure 3].

Cataract was the leading cause of unilateral visual impairment accounting for 12 (37.5%), others were glaucoma 6 (18.7%), refractive error 4 (12.5%), corneal opacity 4 (12.5%), optic atrophy 3 (9.4%), and pterygium 3 (9.4%) [Figure 4].

The prevalence of blindness and visual impairment was higher in the older age groups. All the five persons who were blind in both eyes were 55 years of age and above [Table 3]. This difference was statistically significant ($P = 0.03$). Eighteen persons (81.8%) out of 22 persons that were visually impaired in both eyes were 55 years old and above. This difference was also statistically significant ($P = 0.01$). Among the population found with unilateral visual impairment, the differences in the prevalence was statistically significant ($P = 0.02$). However, the differences in the prevalence of unilateral blindness among the various age groups were not statistically significant ($P = 0.06$) [Table 3].

The highest prevalence of bilateral blindness (14.3%) was observed among those who were 75 years and above, followed by those in the 65–74-year age group (3.2%) while those of 55–64 years' age group constituted 1.9% as shown in Table 3.

The female gender was more affected by visual impairment and blindness more than their male counterparts. Out of the five bilaterally blind persons, 2 (40%) were males, and 3 (60%) were females as shown in Table 4. However, this was not statistically significant ($P = 1.00$). The male/female ratio of bilateral blindness was 1:1.5. Out of the 22 persons that were with bilateral visual impairment, 9 (40.9) were males, and 13 (59.1) were females giving a male/female ratio of 1:1.4. This difference was also not statistically significant ($P = 1.00$).

The male/female ratio for unilateral blindness was 1: 1.3 and for unilateral visual impairment was 1: 1.5 [Table 4]. Bilateral and unilateral blindness, as well as bilateral and unilateral visual impairment, were more common among the female folk although these differences were not statistically significant ($P = 0.097$) [Table 4].

Discussion

The prevalence of bilateral blindness in Emohua LGA, Niger Delta, Nigeria was found to be 1.4% from this study. The

Table 3: Age-specific prevalence of blindness and visual impairment

Age group (years)	Number examined (%)	Bilateral blindness, *n* (%)	Unilateral blindness, *n* (%)	Bilateral visual impairment, *n* (%)	Unilateral visual impairment, *n* (%)
15-24	7 (2.0)	0 (0)	0 (0)	0 (0)	0 (0)
25-34	22 (6.2)	0 (0)	0 (0)	2 (9.1)	3 (13.6)
35-44	86 (24.3)	0 (0)	1 (1.2)	0 (0)	5 (5.8)
45-54	108 (30.6)	0 (0)	3 (2.8)	2 (1.9)	7 (6.5)
55-64	54 (15.3)	1 (1.9)	2 (3.7)	6 (11.1)	9 (16.7)
65-74	62 (17.6)	2 (3.2)	2 (3.2)	8 (12.9)	6 (9.7)
75 and above	14 (4.0)	2 (14.3)	1 (7.1)	4 (28.5)	2 (14.3)
Total	353 (100)	5 (1.4)	9 (2.5)	22 (6.2)	32 (9.1)
95% CI		0.78-2.5	1.2-3.4	5.7-8.5	8.7-9.7

CI: Confidence interval

Table 4: Gender distribution of blindness and visual impairment

Gender	Bilateral blindness, *n* (%)	Unilateral blindness, *n* (%)	Bilateral visual impairment, *n* (%)	Unilateral visual impairment, *n* (%)
Male	2 (40)	4 (44.4)	9 (40.9)	13 (40.6)
Female	3 (60)	5 (55.6)	13 (59.1)	19 (59.4)
Total	5 (100)	9 (100)	22 (100)	32 (100)
Pearson's Chi-square value	0.000	0.000	0.000	0.000
P	1.00	1.00	0.994	0.970

prevalence of blindness in Emohua LGA is higher than the national average of 0.78%.[2] Other community-based studies done in Nigeria showed prevalence ranging between 0.78% and 6.6%.[2,12] Different independent population studies done in Rivers State showed the prevalence of blindness between 1.26% and 2.8%.[13-15] In Ahoada East LGA, Pedro-Egbe *et al*.[13] estimated a prevalence of blindness of 2.8%. Ejimadu and Pedro-Egbe,[14] found that the prevalence of blindness in Ikwerre LGA was 1.26%. Although Emohua, Ahoada East, and Ikwerre LGAs share common sociocultural, health-care system, level of development and geopolitical similarities, the differences in the prevalence of blindness in these areas could probably be attributed to the differences in sample sizes. One thousand five hundred and thirteen subjects participated in the prevalence of blindness study in Ikwerre LGA, 866 people were recruited in the Ahoada East study while 353 subjects participated in this study. In Oyorokotor village in Andoni LGA of Rivers State, the prevalence of blindness was 2.5%.[15] The studies with larger sample population had relatively lower prevalence of blindness compared to those with smaller sample population. However, further investigations need to be conducted to explain these differences.

The Nigeria national blindness and visual impairment survey (2007) had noted that the prevalence of blindness increases significantly with increasing age, from 0.8% at 40–49 years to 23.3% among those aged ≥80 years.[2] This study corroborates the findings of the national blindness and visual impairment survey (2007). The highest prevalence of bilateral blindness (14.3%) was observed among those who were 75 years and above, followed by those in the 65–74 years age group (3.2%) while the prevalence of bilateral blindness among participants of 55–64 years age group constituted 1.9%. This high prevalence is due to senile cataract and chronic glaucoma seen more in the elderly than in the younger population. This finding also validates the findings of Ejimadu and Pedro-Egbe,[14] Pedro-Egbe *et al*.[13] which showed that prevalence of visual impairment was higher in the elderly.

Bilateral and unilateral blindness, as well as bilateral and unilateral visual impairment, were more common among the female folk (1.6% vs. 1.2%) although these differences were not statistically significant. This finding compares well with the Nigerian national blindness and visual impairment survey, 2005–2007 where females had a higher prevalence of blindness than males (4.4% vs. 4.0%).[2] The findings of Ejimadu and Pedro-Egbe[14] in Ikwerre LGA also supports our assertion. However, our finding contrasts with the finding of Ajibode[16] in Ogun State, where more males were visually impaired than their female counterparts. Blindness and visual impairment were observed more among the females than their male counterparts, probably because women are prohibited by some traditions from leaving their homes even when they need medical help. Furthermore, women are expected to take care of their homes and raise children while the men go out to fend for the families. The observed difference could also be due to gender and socioeconomic differences in health-seeking behavior and barriers to uptake of services.

The prevalence of blindness in this study (1.4%) is closer to the WHO estimate of 1% for Nigeria than those obtained in Ahoada East LGA and Oyorokotor in Andoni LGA. This study compares well in methodology with the nationally representative sample of 16,507 adults using multistage stratified random sampling survey in Pakistan. More so, in both studies, blindness was defined on the basis of presenting VA. However, in the Pakistan blindness survey, a prevalence of 2.7% was observed.[10] This difference could probably be accounted for because of the difference in the sample size and different geographical and sociocultural settings.

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In general, a prevalence of 1.4% blindness as found in this study is high. This could be attributed to ignorance, poverty, harmful traditional practices, and inhibitions that restrict seeking prompt medical attention. This, however, need further investigation.

The prevalence of bilateral visual impairment in this study was 6.2%. In the study by Omoni[15] in a fishing community in Rivers State, the prevalence of visual impairment was 7.5% while Pedro-Egbe *et al*.[13] reported a prevalence of 8.2% in a similar study in Ahoada East LGA also in Rivers State. The reason (s) for this difference need further investigation.

Refractive error was the most common cause of bilateral visual impairment in this study, constituting 54.6%. This may be because most of the study participants were farmers who reject glasses, claiming that it makes them uncomfortable while working in their farms. Some believe that people wearing eyeglasses or having one form of eye problem or the other have some spiritual problems. This group of people would, therefore, not seek ophthalmic assistance.

It is worthy of note that 80% of blindness and 77% of visual impairment in this study are due to avoidable causes. This is similar to the findings of Stevens *et al*.[17] and Pascolini *et al*.[18] in their global update of available data on visual impairment. Other comparative studies done elsewhere in Rivers State also lend support to this finding. Pedro-Egbe *et al*.[13] reported 80% of blindness and 90% of visual impairment while Omoni[15] in her study noted that 90% of blindness and 75% of visual impairment were avoidable.

This study was conducted in the respondents' houses and did not include slit lamp and visual field assessment. Therefore, the study was likely to have underestimated the prevalence of glaucoma and possibly other ocular diseases where VA was maintained until the late stage of the diseases. Subsequent surveys should be done with detailed ocular examinations including slit lamp and visual field assessment to accurately diagnose ocular disorders.

Conclusion

This study provided important epidemiological data with regards to the burden of blindness and visual impairment in Emohua LGA. Blindness and visual impairment are more common in the older age groups and female gender in Emohua LGA. Eighty percent of the causes of blindness and 77% of the causes of visual impairment in Emohua LGA are preventable. Most of the cases of blindness and visual impairment could have been prevented or even cured if there were good health education and effective eye care service delivery in the LGA. Government and nongovernmental organizations should as a matter of urgency step up comprehensive eye health-care programs to realize the goals of Vision 2020 in Emohua LGA.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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