Original Article

Prevalence of low vision and barriers to uptake of low vision services in an adult population of Southwest Nigeria

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Abstract

Aim: To determine the prevalence of functional low vision and barriers to uptake of low vision services in Oluyole Local Government Area, Oyo State with a view to obtaining data for proper planning of low vision services. **Methods:** A population-based cross-sectional study. Multistage random sampling technique with probability proportion to size was used to select respondents from the L.G.A. The study involved the administration of questionnaires to elicit basic demographic data, ocular history, and barriers to uptake of low vision services as well as ocular examination to determine the causes of low vision. **Results:** A total of 419 respondents participated in the study, 303 were females with male-to-female ratio of 1:2.6 and a mean age of 49.38 (± 13.17) years. Fourteen (3.3%) respondents were found to have functional low vision. The main causes of functional low vision were glaucoma (32%) and age-related macular degeneration (ARMD) (16%). Functional low vision was strongly associated with older age ($p = 0.019$) and the main barriers to utilization of low vision services were lack of awareness of the services and financial constraints. **Conclusion:** A significant burden of functional low vision was found in Oluyole Local Government Area of Oyo State. There is need for regular community-based surveys in other parts of the country to aid proper planning of low vision services in the host communities and the country as a whole. Also, more awareness needs to be created about common ocular diseases and facilities for appropriate treatment of these diseases.

Keywords: functional vision, low vision, low vision services, Nigeria, uptake, utilization

Introduction

A person with functional low vision (FLV) is one who after medical, surgical, and/or optical intervention has a corrected visual acuity in the better eye of < 6/18 to light perception or a central visual field of < 20°, but who uses or has the potential to use vision for the planning and/or execution of a task.[1] This definition of low vision, therefore, excludes visual loss from treatable causes and has been adopted in a few reported population-based studies on FLV.[2-5] Though data are limited, available population-based studies on FLV showed its burden is significant. In Nigeria, for example, over 750,000 adults aged ≥ 40 years were estimated to have FLV.[5] This was higher than that reported (727,000) in another adult population aged ≥ 30 years in Pakistan.[2] However, Dandona *et al.*[4] in a study in India found 10.6 million people across all ages were affected.

Functional low vision affects the quality of life of affected individuals,[6] hence the need for the provision of low vision services. These services are, however, not readily available in most parts of the world, especially in the developing countries.[7] Such services include the use of optical devices, environmental modifications, and rehabilitation depending on the level of visual function. Even where these services exist, uptake could be limited due to various barriers like transportation difficulties, language barrier, perceived ineffectiveness of visual rehabilitation, needing an accompanying person, lack of information, concurrent

Access this article online

Quick Response Code:

Website: www.nigerianjournalofophthalmology.com

DOI: 10.4103/njo.njo_14_22

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Received: 18 July 2022 **Revised:** 8 November 2022
Accepted: 23 December 2022 **Published:** 15 March 2023

How to cite this article: Okwudishu IA, Ugalahi MO, Olusanya BA, Bekibele CO. Prevalence of low vision and barriers to uptake of low vision services in an adult population of Southwest Nigeria. Niger J Ophthalmol 2023;31:19-24.

health problems, cost, fear, family responsibilities, ageism, and ability to cope.[8-11]

Individuals with FLV require identification and assessment for low vision care to enable them live better quality lives.[3] Data from population-based studies are necessary for the estimation of the number of people affected with FLV and such information is useful for policy formation and efficient use of available resources for the proper planning and delivery of effective low vision services. Therefore, this study aims to determine the prevalence and causes of FLV, as well as the perceived barriers to uptake of low vision services in adult respondents in Oluyole Local Government Area of Oyo State. In the long term, data obtained will help in designing locally suitable programs for eye care and the proper planning of low vision services at different levels of government so that affected individuals may live quality lives.

Materials and Methods

This study was a population-based, descriptive, cross-sectional study conducted in Oluyole Local Government Area of Oyo State, one of the oldest of the 33 local government areas in Oyo state. The study followed the tenets of the Helsinki Declaration and ethical approval was obtained from the Oyo State Research Ethical Review Committee, Ministry of Health. Informed consent was obtained from all the respondents. The survey team was made up of the principal investigator and four field assistants, including a primary health care worker and a nurse.

Eligible participants were individuals aged 16 years and above who had been resident within the community for at least 1 year prior to the study and were willing to participate in the study.

A minimum sample size of 404 was calculated using the Leslie and Kish formula for single proportion for population studies based on the prevalence of 3.5% reported from the Nigeria National Survey of Blindness and Visual Impairment[5] with precision set at 2.5%, design effect of 1.75, and 10% nonresponse rate. A multistage, stratified, cluster random sampling technique with probability proportional to size was used to select a cross-sectional representative sample of the population from six of the 10 political wards that were made up of three urban and three rural wards.

Three settlements were selected from each of the six wards by simple random sampling. In each settlement, clusters of houses were selected. The first house was determined by spinning a bottle at the center of the settlement and picking the direction the bottle top faced. Subsequently, houses along the same direction were sampled and eligible respondents recruited until the required population sample size was obtained using probability proportional to size. Where the required number of eligible respondents had been recruited in a selected cluster of houses and there were still eligible respondents in the last household being sampled, the remaining respondents were also enumerated. Where no eligible respondents were found in a selected cluster of houses, the next cluster was selected.

Each participant underwent an interview which was performed by the trained research assistants using a semistructured questionnaire to obtain information on basic demographic data (age, sex, occupation, educational level, and religion), ocular history (ocular complaints, previous surgery, spectacle wear, ocular medications, trauma), and barriers to uptake of eye care services.

Distant visual acuity testing was done by the trained primary healthcare worker and the nurse using an opaque Snellen's alphabet chart or an illiterate E-chart where applicable. Presenting distant visual acuity was assessed with glasses where available, one eye at a time. Visual acuity (VA) was recorded as the last line read correctly. A presenting VA $\geq$ 6/18 required no further tests, whereas a VA $<$ 6/18 was cross-checked and a pinhole used to check for any improvement. All aphakic respondents had their VA rechecked with +10 dioptre lenses. Near vision was also tested using the near vision chart. Subsequently, respondents with presenting VA $\geq$ 6/18 underwent basic ocular examinations using a pen torch and a direct ophthalmoscope, whereas those with presenting VA $<$ 6/18 underwent more detailed examination of their anterior segments using a magnifying loupe and a pen torch and dilated fundoscopy using an ophthalmoscope to examine the posterior segments of each eye after the pupils had been dilated with 1% tropicamide and 10% phenylephrine eye drops.

After ocular examination, each respondent with VA $<$ 6/18 (after using pinhole or +10D lens) in either eye was assigned a single main cause for poor vision. Those whose VA improved (VA $\geq$ 6/18) after using pinhole were also assigned a diagnosis. All anterior and posterior segment examination were conducted by the principal investigator. The definitions of the various diagnoses/disease entities were based on the definitions used in the Nigeria National Survey of Blindness and Visual Impairment.[12,13]

Statistical Analysis

Data entry, validation, cleaning, and analysis were done using IBM SPSS version 21 (IBM Corp.: Armonk, NY). Summary statistics was presented using frequency tables, charts, means, and rates. Chi–square was used to test for associations between qualitative variables. Level of statistical significance was set at 5%.

Results

A total of 419 eligible respondents completed all stages of data collection and were included in the study. The selected wards, their populations, and distribution of the respondents are presented in [Table 1]. Majority (73.7%) of the respondents resided in the urban wards. The ages of

Table 1: Sample Size Distribution in the Wards/Settlements

Wards	Selected Settlements	Total Sample Population	Number of Selected Respondents
Rural			
Abanla	Ajanla, Alaho, Oja-Ibadan	2,109	51
Ayegun	Balogun, Ayegun, Olode	1,030	25
Onipe	Dalley, Lagunju, Longe	1,338	34
Urban			
Idi-Ayunre	Aba Ila, Aba Alapata, Alata	1,444	73
Olomi	Aba Baale, Olunde, Olonde	2,820	42
Orita	Afonja, Idi-Iroko, Podo	1,840	94
Total		**10,581**	**419**

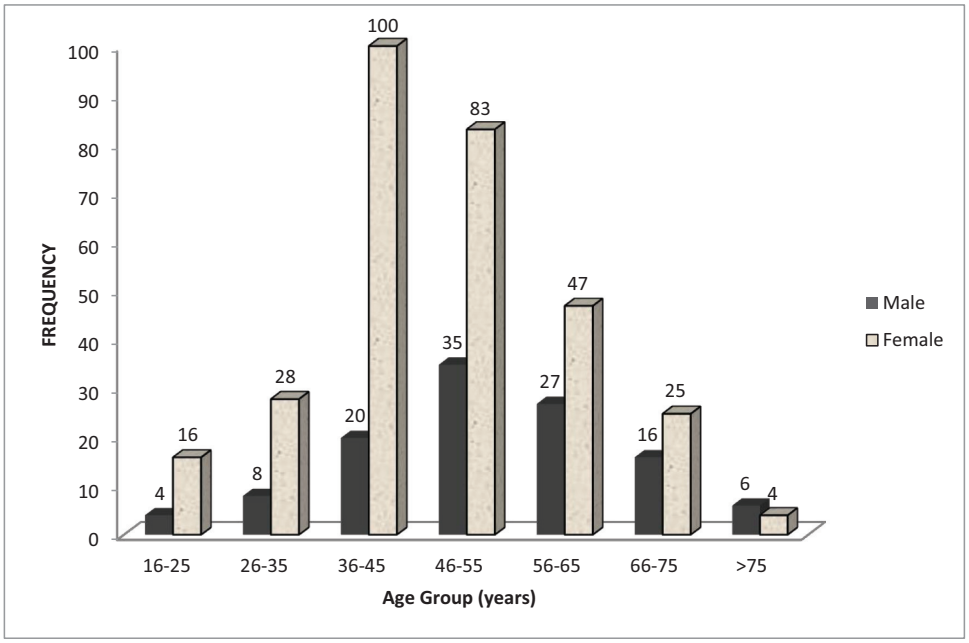

Figure 1: Age and sex distribution of respondents.

respondents ranged between 16 and 85 years, with a mean age of 49.38 ± 13.17 years. The highest number of respondents (28.6%) was seen in the 36 to 45 years age group ([Figure 1]) and there were more female respondents (72.3%) compared with males, with a male-to-female ratio of 1:2.6. Two hundred and sixty-two (62.6%) respondents had at least secondary school education. One hundred and forty-eight (35.3%) respondents were traders.

Overall, 49 (11.7%) respondents had presenting VA < 6/18, whereas two respondents (0.5%) were found to be blind (using the Revised ICD-10 definition). Following pinhole assessment, only 25 (51.0%) of them had corrected VA < 6/18 in the better eye ([Table 2]). Further analyses focused on these 25 respondents with corrected VA of < 6/18 in their better eye.

Among these 25 respondents, the clinical diagnosis was cataract in nine (36.0%), glaucoma in eight (32.0%), and age-related macular degeneration (ARMD) in four (16.0%) respondents ([Table 3]). Using the operational definition for FLV that excludes visual loss from treatable causes (e.g., cataract, ectopia lentis, and posterior capsular opacity), 14 out of the 419 respondents who participated in the study were identified to have FLV, giving a prevalence of 3.3% (95% CI: 1.620–5.062). Glaucoma was the commonest cause of FLV, accounting for eight (57.2%) of cases. Other causes were ARMD (4; 28.6%), degenerative myopia (1; 7.1%), and macular scar (1; 7.1%).

The proportion of respondents with FLV was significantly higher among respondents older than 55 years, as well as among rural residents. Males and respondents with lower educational status also had higher proportions of FLV but the differences were not statistically significant ([Table 4]). Upon multivariate logistic regression, however, only the age of the respondents was associated with FLV, p-value < 0.04 ([Table 5]).

Nine (64.3%) out of the 14 respondents with FLV gave history of previous ophthalmic consultations. The major barriers given by the remaining five respondents who had

Table 2: Visual Acuity with Pinhole in the Better Eye of 49 Respondents who had Presenting Visual Acuity < 6/18

Variables	Frequency	Percentage (%)
VA with pinhole	(n = 49)	
≥ 6/18	24	49.0
< 6/18–6/60	15	30.6
< 6/60–3/60	8	16.3
< 3/60–LP*	2	4.1
NLP**	0	0.0
Total	49	100.0

*LP – Light perception **NLP – No Light Perception

Table 3: Clinical Diagnosis in the Better Eye of 25 Respondents with Corrected VA <6/18

VA* with Pinhole Diagnosis	< 6/18–6/60 *N* (%)	< 6/60–3/60 *N* (%)	< 3/60–LP *N* (%)	Total *N* (%)
ARMD**	**3 (12.0%)**	**1 (4.0%)**	**0 (0.0%)**	**4 (16.0%)**
Cataract	7 (28.0%)	2 (8.0%)	0 (0.0%)	9 (36.0%)
Glaucoma	**3 (12.0%)**	**3 (12.0%)**	**2 (8.0%)**	**8 (32.0%)**
Degenerative Myopia	**1 (4.0%)**	**0 (0.0%)**	**0 (0.0%)**	**1 (4.0%)**
Ectopia Lentis	0 (0.0%)	1 (4.0%)	0 (0.0%)	1 (4.0%)
Macular Scar	**0 (0.0%)**	**1 (4.0%)**	**0 (0.0%)**	**1 (4.0%)**
PCO***	1 (4.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)
Total	15 (60.0%)	8 (32.0%)	2 (8.0%)	25 (100.0%)

Figures for the causes of functional low vision are highlighted in bold text. *VA – Visual acuity **ARMD – Age-Related Macular Degeneration ***PCO – Posterior Capsular Opacity.

Table 4: Association between Demographic Characteristics and Functional Low Vision

Variable		Functional Low Vision		Chi-square	*P* value
		Yes(14 respondents)	No(405 respondents)		
		Number (%)	Number (%)		
Age in years	≤ 55	4 (1.4)	290 (98.6)	11.972	<0.001*
	> 55	10 (8.0)	115 (92.0)		
Sex	Male	7 (6.0)	109 (94.0)	3.603	0.058
	Female	7 (2.3)	296 (97.7)		
Residence	Urban	7 (2.3)	302 (97.7)	4.204	0.040*
	Rural	7 (6.4)	103 (93.6)		
Educational level	At least secondary	11 (4.2)	251 (95.8)	1.591	0.207
	Tertiary	3 (1.9)	154 (98.1)		

*p-Value < 0.05.

Table 5: Multivariate Logistic Regression of Association between Demographic Characteristics and Functional Low Vision

SociodemographicCharacteristics	Odds Ratio	95% CI**	*p*-Value
Ward			
Rural	0.453	0.145–1.409	0.171
Urban	1.00		
Sex			
Male	0.568	0.184–1.752	0.325
Female	1.00		
Age			
≤ 55 years	1.00		
> 55 years	0.194	0.056–0.676	0.010*
Educational Level			
At least secondary	0.901	0.224–3.629	0.884
Tertiary	1.00		

Table 6: Reasons for not Seeking Low Vision Services among 5 Respondents with Functional Low Vision

Reasons* ($N = 5$)	Frequency (%)
Not aware of services	5 (100.0)
No money to pay for services	5 (100.0)
Don't know where to go	2 (40.0)
No escort	1 (20.0)
Fear	1 (20.0)

*Multiple responses in some respondents.

never sought any form of eye care, including low vision services were lack of awareness and financial constraints (lack of money to pay for services) as presented in ([Table 6]).

Discussion

The prevalence of FLV in this study was 3.3%, whereas prevalence of blindness was 0.5%. This prevalence of FLV observed is similar to the reported National crude prevalence of 3.5% for Nigeria,[5] but slightly higher than the 2.1% reported in the National blindness survey in Pakistan.[2] On the contrary, in India, a far lower prevalence of 1.05% was reported in a population-based study after standardization.[4] These observed differences may be due to the disparity in sampling. In the Indian study, a sample size of over 10,000 people of all ages was used, in contrast to 419 people aged ≥ 16 years who participated in this present study. Another possible explanation for this disparity in prevalence may be the wider spread and higher effectivity of eye outreach programs in India and Pakistan that could have identified and provided prompt treatment for these disease before they developed to the stage of low vision as compared to eye outreaches in Nigeria.

Glaucoma was the most common cause of FLV observed in this study, followed by ARMD. Other causes include degenerative myopia and macula scar. This is similar to findings in the Nigerian Blindness and Visual Impairment Survey,[5] where glaucoma, corneal conditions, and ARMD were the leading causes of FLV across most geopolitical regions of the country. However, in Pakistan, glaucoma was the third major cause of FLV after corneal and retinal diseases.[2] In Southern India, glaucoma ranked fourth as a cause of FLV after retinal diseases, amblyopia, and optic atrophy.[4] Corneal diseases were less common in India.[4] These geographical differences make it imperative to conduct and use findings from local studies in the planning of low vision services.

Functional low vision has been associated with sociodemographic characteristics in different studies.[2,4,5] Initial analysis in our study showed a significantly higher proportion of respondents with FLV residing in the rural wards and a significant increase in FLV among older age groups. No strong association was, however, found with gender and education, though there was a higher proportion of FLV in male respondents and those with low educational status. In the Nigerian national study, strong associations were found with older age, illiteracy ($p = 0.001$), and being unmarried ($p = 0.001$), whereas none was found with gender and rural residence.[5]

When the association of FLV with these sociodemographic characteristics was subjected to multivariate logistic regression analysis in this study, FLV was found to be strongly associated with age alone. Majority of the cases of FLV were seen in respondents over 45 years of age, with the highest proportion observed above 75 years. This increase with age is probably due to the development of glaucoma which is often seen at an older age, as observed in this study. This strong association of FLV with age has also been reported in other population-based studies in Nigeria[5] and elsewhere in Pakistan[2] and India.[4] The Pakistan study also reported a strong association of FLV with illiteracy,[2] similar to findings in India.[4] A strong association was found with those with low socioeconomic status in India.[4] No significant association was found with rural residence and gender in the study in Pakistan, similar to the findings of the present study.[2] This is in contrast to the Nigerian national survey where marginal significance was found with the male gender after multivariate analysis.[5]

Five of the respondents with FLV had never sought any form of eye care (including low vision services) for their ocular conditions. The main barriers to uptake of low vision services among these five respondents were: not being aware of such services and not having money to pay for the services. Other barriers were: not knowing where to seek such services, lack of an escort, and fear of further damage to the eye.

O'Connor *et al.*[11] in a study in Australia reported that less than half of the eligible people recruited had followed through with their referral for low vision services. In their study, the main barriers identified included lack of information, lack of an escort, transportation problems, poor health, and language barriers. They suggested the need for also addressing access and attitudinal barriers in addition to those due to referral. The lack of awareness of low vision services was also reported in another study in Australia[14], in addition to transportation problems, acceptance of low vision and the understanding of low vision services. Similarly, Overbury *et al.*[15] in Canada also found 33% of the 702 study participants were unaware of such services. A study in the United States of America also identified economic, transportation, psychosocial barriers as well as lack of knowledge of vision rehabilitation as barriers to low vision services.[16] In this present study, lack of money for services was also a main barrier. In another study, concurrent health problems and perception that either the service was not required or would not help were reported as the main barriers.[10] The present study also observed fear as a barrier in a minority of the respondents. Chiang *et al.*[17] in a global survey of low vision service provision reported that majority (80%) of countries had a poor coverage (≤ 10%). The survey also identified sociodemographic and economic barriers like cost, awareness, and rural residency.

The main limitations of this study were the nonutilization of a slit-lamp microscope and binocular indirect ophthalmoscope for fundal examination on the field. This could have underestimated the contribution of other posterior segment pathologies to the causes of low vision. In addition, the prevalence of glaucoma could have been underestimated as visual field analysis was not performed.

In conclusion, FLV is common among the older population in Oluyole Local Government Area with a significant proportion being unaware of services for low vision. There is need to address identified barriers so as to ensure effective and proper planning of low vision services. Strategies to address this would include creating awareness among the populace through eye health sensitization programs at community level to educate people about general ocular health, common eye diseases, and facilities for appropriate treatment.

Acknowledgment

We appreciate Dr Oguniyan O and Mr Okorie F for their assistance with the planning and statistical analysis of this study.

Financial support and sponsorship

The study was not funded by any agency or organization.

Conflicts of interest

The authors declare that they do not have any conflict of interest.

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