Vision-related Quality of Life among Adult Patients with Visual Impairment at a Tertiary Eye Centre, South-South Nigeria

Ernest I. Ezeh[1,2*] and Roseline N. Ezeh[2]

[1]*Department of Ophthalmology, University of Calabar, P.M.B. 1115, Calabar, Cross River State, Nigeria.*
[2]*Department of Ophthalmology, University of Calabar Teaching Hospital, Calabar, Cross River State, Nigeria.*

Authors' contributions

This work was carried out in collaboration between both authors. Author EIE designed the study, performed the statistical analysis and wrote the first draft of the manuscript. Author RNE managed the literature searches, wrote the protocol, proofread and edited the manuscript. Both authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Aim: To determine the vision-related quality of life (VRQOL) and associated factors among adult patients with visual impairment.
Study Design: It was a cross-sectional study.
Place and Duration of Study: Department of Ophthalmology, University of Calabar Teaching Hospital, Calabar, Cross River State, Nigeria, between August 2015 and March 2016.
Methodology: We consecutively recruited 270 patients aged 18 to 90 years with visual impairment. Presenting visual acuity was assessed to determine the degree of visual impairment, anterior segment and posterior segment examinations as well as refraction were done to establish clinical diagnosis, and an interviewer National Eye Institute's 25-itemVisual Functioning Questionnaire (NEI-VFQ-25) was administered to estimate the vision-related quality of life (VRQOL). Data was entered into and analyzed with SPSS for Windows version 20. Descriptive

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Corresponding author: E-mail: ezehiyk@yahoo.com;

statistics such as frequency, mean, standard deviation, and range with 95% confidence interval were calculated and the Chi square (χ^2) test for categorical variables and the Student's t-test for continuous variables were used for test of significance, p value <0.05. ANOVA test, including Post-hoc analysis were used to determine associations between categorical and numerical variables at *p* value <0.05.

Results: A total of 270 study subjects participated in the study. The study participants included 152(56.3%) males and 118(43.7%) females, with Mean age ± SD was 51.07±16.91 years. Based on the intra study categorization of VRQOL among the study participants, most (85.6%) had good VRQOL. However, the overall mean VRQOL score was remarkably low 41.23±22.87. The proportion of poor VRQOL was 39 (14.4%). The poor VRQOL was significantly associated with blindness 11.60±19.10 (*p* < 0.001). Age ≥80 years [44.0(95% CI: 27.4-60.7)], rural residents [64.9(95% CI: 58.7-71.1)], no formal education [48.5(95% CI: 33.5-63.5)] and widowhood [48.0(95% CI: 32.4-60.7)] had statistically significant association with low mean VRQOL scores.

Conclusion: Above three-fourth of the participants had good VRQOL, with reference to the categorization of in this study. However, the overall mean VRQOL score was remarkably low. Blindness, older age, rural residency, illiteracy, widowhood, agricultural workers and Ibo ethnicity had a statistically significant association with low vision-related quality of life.

Keywords: Vision-related quality of life; visual impairment; adults; visual acuity; blindness.

1. INTRODUCTION

Vision-related quality of life (VRQOL) is defined as a person's satisfaction with their visual ability and how their vision impacts on their daily life [1]. VRQOL represents the degree to which vision impacts an individual's ability to complete activities of daily living and one's social, emotional and economic well-being [2]. It also describes an individual's overall sense of well-being that is due to or determine by the individual's level of visual functioning [3]. Visual functioning, also called Functional vision, refers to the processing and use of visual information in the performance of visually related tasks, e.g. walking, eating, reading, driving, or recognizing individuals and objects, at any given distance or in a crowd [3,4].

Humans are primarily visually motivated for survival, and sight is thought to account for about 80% of the function of all the five senses combined [5]. Hence, visual impairment (VI), which is referred to as all degrees of reduction in vision as measured by visual acuity testing, [6] leads to a remarkable restriction in all areas of life and, in particular, VRQOL by reducing activities associated with participation in society and religion, mobility, recreation, daily living, and intense visual tasks [7,8]. About 90% of the world's visually impaired live in developing countries [9]. In sub-Saharan Africa, the average prevalence of blindness is about 1.4% [10]. Based on the presenting visual acuity, the prevalence of blindness and severe visual impairment (SVI) in Nigeria was 4.2% and 1.5% respectively. Using best corrected visual acuity (BCVA), 3.4% were blind, 0.8% had SVI, 5.3% had moderate visual impairment, and 4.5% had mild visual impairment [11].

The traditional methods of visual function assessment, such as visual acuity, visual field, contrast sensitivity and color vision, do not adequately provide realistic information on functional vision. They do not adequately assess individual's ability to complete activities of daily living neither do they exhaustively provide information about the impact of visual damage from the patients' perspective. It is therefore pertinent to employ a tool that could fill in this gap, invariably, improving the efficient delivery of patient-centered care.

VRQOL can be assessed by measuring the degree of impairment experienced in activities of daily living that rely on sight, (i.e., impaired daily function secondary to visual difficulties is a proxy for visual function) [2]. A myriad of VRQOL exist, however, the National Eye Institute's 25-itemVisual Functioning Questionnaire (NEI-VFQ-25), a standardized visual function questionnaire for VRQOL assessment in adult patients, has been found to be quite useful. NEI-VFQ-25 questionnaire consists of items relevant to most visually impaired adults, regardless of the underlying cause of visual impairment [5]. It has shown verifiable reliability and validity across multiple chronic eye conditions, and has acceptable applicability among populations of African origin [12,13].

Despite the high prevalence of visual impairment in Nigeria [11], there is limited information on VRQOL and associated factors among people with visual impairment in Nigeria in general and the study area in particular. Therefore, this study aims to determine VRQOL and associated factors among adult patients with visual impairment.

2. MATERIALS AND METHODS

2.1 Study Design, Setting and Sampling

An institution-based cross-sectional study was conducted from August 2015 to March 2016. The study was conducted at the Ophthalmology department, University of Calabar Teaching Hospital (UCTH). This is a tertiary eye care center that provides a comprehensive clinical and community eye health services and serves as a major referral center for over 4 million people living in Cross River State, South-South Nigeria, as well as some patients from the adjoining States. It is the only tertiary eye care center in Cross River State. It has five special clinics (pediatric and strabismus, oculoplastics and anterior segment, vitreo-retina, medical retina, and glaucoma). The range of services offered include general and subspecialty ophthalmic clinical and surgical services, refraction services, optical services, rehabilitation and low vision services, counseling, investigative services such as Visual field testing, biometry, keratometry, as well as fellowship training in pediatric and strabismus, training for medical students, resident doctors, and other health care workers.

The hospital is located in Calabar Municipality within Calabar Metropolis, the state capital of Cross River State. Calabar has an area of 406km and a population of 371,022 as at the 2006 census. It is located between latitude 4°57 N and longitude 8°19 E, within the tropical rain forest of Nigeria. It is bounded in the North by Odukpani Local Government Area, in the West by Calabar River and at the South and East by the Great Qua River [14]. The inhabitants are predominantly Efik-speaking people. They are mainly public servants, subsistence farmers, fishermen, petty traders, and retired civil servants.

A sample size with a total of 262 patients was determined with single population proportion formula considering total population of 6346 which is the average total number of patients seen yearly, over the past three consecutive years. Prevalence of visual impairment 20.2% in a tertiary eye clinic in Southern Nigeria (p = 20%) [5] and margin of error, d = 5% were used. The generated sample size was found to be n = 248. Considering 10% for the non-response rate, the total sample size was 262.

All consenting, consecutive, visually impaired patients aged 18 years and above (both new and patients on follow-up) attending the Ophthalmology department, UCTH, during the study period were included in the study.

The study was conducted in accordance with the Declaration of Helsinki and ethical approval was obtained from the Health Research Ethics Committee of the University of Calabar Teaching Hospital UCTH/HREC/33/289. Patient information on socio-demographics and oculo-visual parameters was obtained with no identifier and confidentiality was maintained. The interviewer-administered NEI-VFQ-25 Questionnaire was administered with the assistance of the pretested Linguistics where necessary.

The NEI-VFQ-25 questionnaire measures an individual's functional visual capabilities and vision-related quality of life. It has five subscales on visual functioning: General vision, visual perception, peripheral vision, sensory adaptation and depth perception; and four subscales on vision-related quality of life: Self-care, mobility and social and mental well-being. The questionnaire consists of items relevant to most visually impaired adults, regardless of the underlying cause. Its relevance and applicability have been demonstrated among populations of African-American as well as African origin [13, 15].

2.2 Operational Definitions

The World Health Organization (WHO) classification of vision was used [16]:

1. Visual impairment: Presenting distance visual acuity of less than 6/18 on the better eye using a Snellen chart placed 6 meters away from the participant.
2. Moderate visual impairment (MVI): Presenting distance visual acuity of less than 6/18 to 6/60 on the better eye using a Snellen chart placed 6 meters away from the participant.

3. Severe visual impairment (SVI): Presenting distance visual acuity of less than 6/60 to 3/60 on the better eye using a Snellen chart placed 6 meters away from the participant.
4. Blind (BL): Presenting distance visual acuity of less than 3/60 to no light perception on the better eye using a Snellen chart placed 6 meters away from the participant.

Categorization of VRQOL [17]:

1. Poor vision-related quality of life: Individuals who scored less than the overall mean in the NEI-VFQ-25 score are considered to have poor VRQOL.
2. Good vision-related quality of life: Individuals who scored the overall mean and above in the NEI-VFQ-25 scores are considered to have good VRQOL.

2.3 Data Collection

Data were collected using a pretested, structured proforma consisting of socio-demographics and oculo-visual parameters. The oculo-visual parameters were obtained by the most senior ophthalmologist in each clinic day. Each participant's presenting visual acuity was assessed using a Snellen chart placed 6 meters away from the participant in a well illuminated area. The tumbling E chart was used for illiterate patients. Slit-lamp examination, tonometry, and funduscopy were used by the ophthalmologist to confirm the diagnosis. We took the ocular disease which best explains the patients' visual reduction. For the cases which have more than one disease which can cause a visual reduction, we considered professional agreement done by three senior ophthalmologists in each clinic day, and took the agreed cause of visual impairment which best explains patients' visual reduction as an ocular condition when at least two of the senior ophthalmologists agree. Afterwards, the principal investigator administered on each participant a face-to-face interview using the NEI-VFQ-25 questionnaire to estimate VRQOL.

2.4 Statistical Analysis

The coded data were checked, cleaned, and entered into statistical package for social sciences (SPSS) for Windows (version 20, SPSS inc., Chicago, IL, USA) for analysis. In accordance with Fletcher's guidelines for scoring the VF and QOL questionnaires [18], subscale scores were obtained by summing all the responses to questions in a particular subscale. All subscale scores, total VF and total QOL were linearly transformed to produce a maximum score of 100, with 100 representing the best possible VF or QOL score and 0 representing the worst [19]. VRQOL was categorized into poor VRQOL and good VRQOL [17]. Descriptive statistics such as frequency, mean, standard deviation, and range with 95% confidence interval were calculated and the Chi square (χ^2) test for categorical variables and the Student's t-test for continuous variables were used for test of significance, *p* value <0.05. ANOVA test, including Post-hoc analysis were used to determine associations between categorical and numerical variables at *p* value <0.05.

3. RESULTS AND DISCUSSION

3.1 Results

A total of 270 people aged 18 to 90 years with visual impairment participated in the study. The Mean age ± SD was 51.07±16.91 years. Among study participants, 152(56.3%) were males, more than two-thirds 210(77.8%) were urban dwellers and about half 125(46.3%) had tertiary level of education (Table 1).

Thirty nine (14.4%) of the participants were blind, 23 (8.5%) had SVI and 208 (77.1%) had MVI (Fig. 1).

In this study, 39 (14.4%) of the participants who were blind accounted for poor VRQOL (Fig. 2).

The overall mean VRQOL score was remarkably low (41.23±22.87) and the poor VRQOL was significantly associated with blindness (Table 2).

Table 3 shows the total visual function (VF) and quality of life (QOL) mean scores by causes among study participants. The total mean score for visual function and quality of life were significantly lower for those who had glaucoma, followed by cataract. Similarly, participants who had glaucoma had a significantly poor VRQOL scores compared with all the other causes of visual impairment (p<0.001).

Table 1. Socio-demographic characteristics of 270 study participants at University of Calabar Teaching Hospital Eye Department, Nigeria 2016 (n=270)

Variables	Frequency	Percentage
Age (years)		
<20	5	1.9
20-39	63	23.3
40-59	111	41.1
60-79	80	29.6
≥80	11	4.1
Sex		
Male	152	56.3
Female	118	43.7
Residence		
Rural	60	22.2
Urban	210	77.8
Education		
None	24	8.9
Primary	47	17.4
Vocational	10	3.7
Secondary	64	23.7
Tertiary	125	46.3
Marital status		
Single	61	22.6
Married	207	76.7
Widowed	2	0.7
Religion		
Christianity	266	98.5
Islam	4	1.5
Occupation		
Professional	38	14.1
Agric. Worker	36	13.4
Public servant	56	20.7
Trading	48	17.8
Student	27	10.0
Retired	47	17.4
Unemployed	12	4.4
Others	6	2.2
Monthly income		
< ₦18,000	166	61.5
≥ ₦18,000	104	38.5
Ethnicity		
Efik	97	35.9
Ekoi	54	20.0
Ibibio	42	15.6
Annang	13	4.8
Ibo	55	20.4
Others	9	3.3

The results of ANOVA test with Post-hoc analysis showed that low VRQOL was significantly associated with age, residence, educational level, marital status, occupation, ethnicity and level of VI. Significantly low mean VRQOL scores were found in participants' ≥80 years, rural residents, no formal education, widowed, agricultural workers and Ibo tribe (Table. 4).
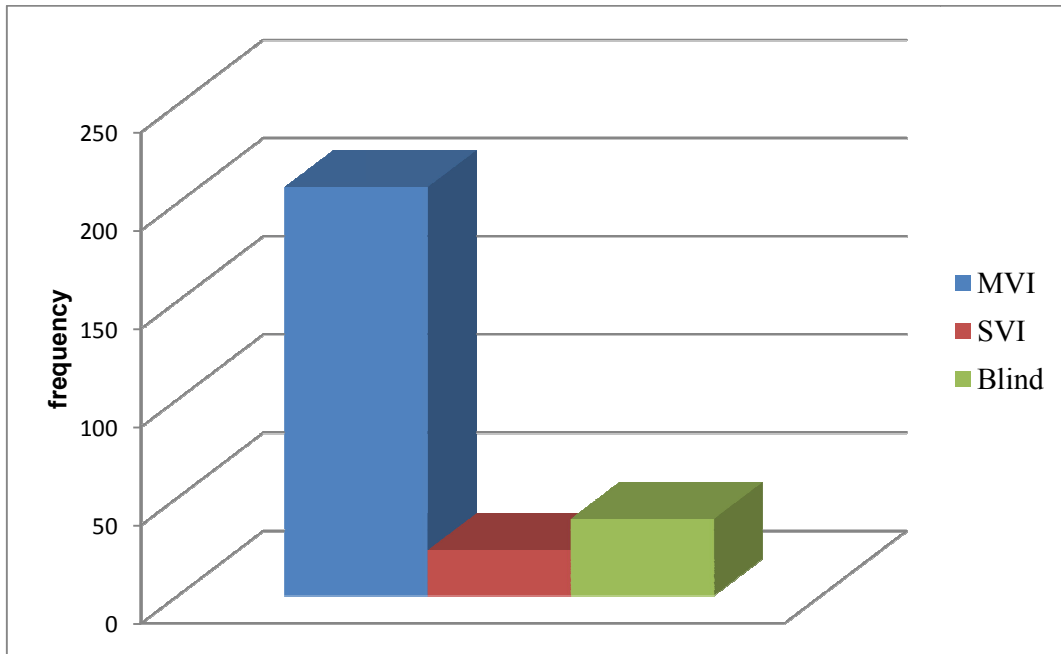
Fig. 1. Distribution of visual impairment in study participants at University of Calabar Teaching Hospital Eye Department, Nigeria 2016 (n=270)
*MVI: Moderate Visual Impairment. SVI: Severe Visual Impairment. Blind: Blindness
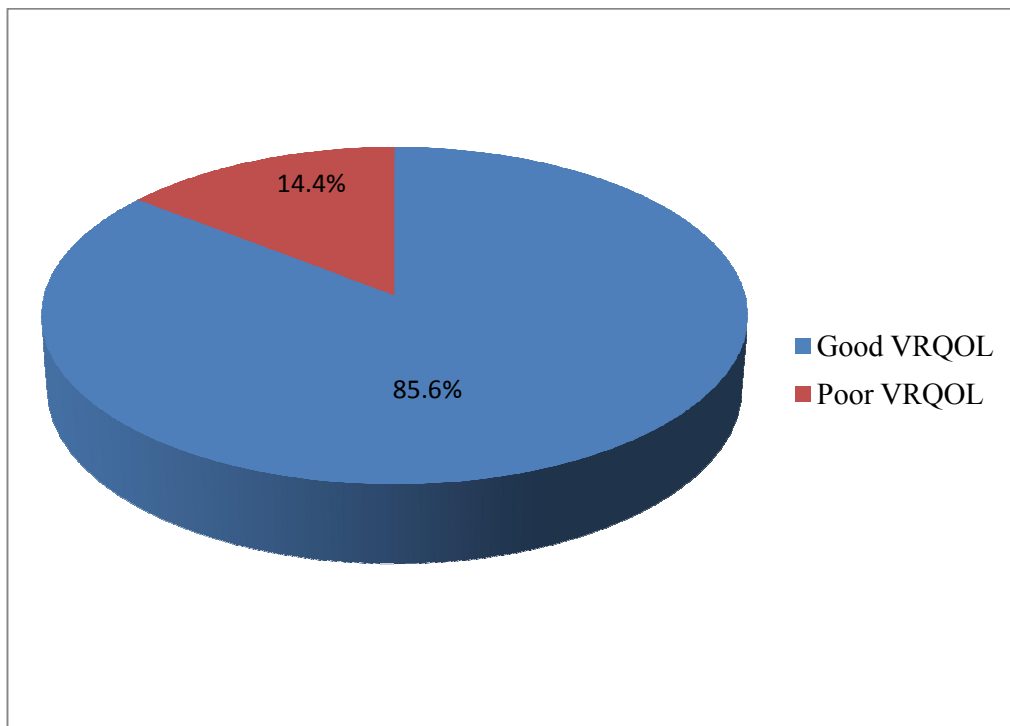
Fig. 2. Categorization of vision related quality of life of study participants at University of Calabar Teaching Hospital Eye Department, Nigeria 2016 (n=270)
*VRQOL: Vision Related Quality of Life

Table 2. VRQOL mean scores by category of visual impairment among study participants at University of Calabar Teaching Hospital Eye Department, Nigeria 2016 (n=270)

Variable	Moderate VI (Mean ± SD)	Severe VI (Mean ± SD)	Blindness (Mean ± SD)	Test statistics (p-value)
VF:	n=208	n=23	n=39	
Near vision	62.77±25.41	48.07±32.15	9.92±15.74	ANOVA(<0.001*)
Distance vision	51.02±23.76	41.79±19.00	7.69±14.16	
Color vision	88.61±25.24	79.13±20.92	21.79±34.49	
Peripheral vision	64.05±32.24	50.87±21.72	10.26±23.45	
Total VF	66.61±23.77	54.97±19.49	12.41±20.80	
QOL:	n=208	n=23	n=39	
Social functioning	75.36±28.78	61.33±25.22	15.47±24.87	ANOVA(<0.001*)
Mental health	58.87±33.88	28.96±23.91	10.51±18.73	
Role difficulties	65.32±32.25	32.93±21.67	5.64±8.68	
Dependency	72.91±32.51	55.68±29.51	11.41±22.19	
Total QOL	68.12±29.56	44.77±21.64	10.79±17.40	
Mean VRQOL	67.37±26.67	49.87±20.57	11.60±19.10	
Overall mean VRQOL			41.23±22.87	

*=Statistically significant; #VF: Visual Function. VI: Visual impairment.
QOL: Quality of Life

Table 3. Total visual function (VF) and quality of life (QOL) mean scores by causes among study participants at University of Calabar Teaching Hospital Eye Department, Nigeria 2016 (n=270)

Causes of visual impairment	Frequency n=270	Visual function: Mean score (95% CI)	p-value	Quality of life: Mean score (95% CI)	p-value
Cataract	n=75	46.33(39.69-52.98)	<0.001*	46.00 (38.57-53.42)	<0.001*
Glaucoma	n=55	41.13 (32.91-49.35)		37.58 (29.15-46.01)	
Refractive error	n=97	79.48 (76.17-82.79)		82.92 (78.62-87.21)	
Others#	n=43	50.18 (42.27-58.09)		47.88 (37.98-57.78)	

*=Statistically significant
 # = retinal diseases, corneal opacity, ocular trauma

Table 4. Factors associated with low vision-related quality of life among study participants at University of Calabar Teaching Hospital Eye Department, Nigeria 2016 (n=270)

Characteristics	Total VRQOL Mean(95% CI)	Test statistics(p-value)
Age group(years)		
<20	70.9(53.3-88.4)	ANOVA(0.215)
20-39	80.2(75.0-85.4)	ANOVA(<0.001*)
40-59	79.7(75.6-83.7)	ANOVA(<0.001*)
60-79	72.8(68.1-77.6)	ANOVA(<0.001*)
≥80	44.0(27.4-60.7)	Reference category
Sex		
Male	75.9(72.3-79.4)	Reference category
Female	76.5(72.5-80.6)	T-test(0.798)
Residence		
Rural	64.9(58.7-71.1)	Reference category
Urban	79.7(76.9-82.5)	T-test(<0.001*)
Marital status		
Single	73.0(67.0-79.1)	ANOVA(0.609)
Married	77.3(74.4-80.2)	Reference category
Widowed	48.0(32.4-60.7)	ANOVA(0.003*)

Characteristics	Total VRQOL Mean(95% CI)	Test statistics(p-value)
Religion		
Christianity	76.0(73.3-78.7)	ANOVA(0.276)
Islam	89.0(69.7-108.2)	Reference category
Education		
None	48.5(33.5-63.5)	Reference category
Primary	64.6(56.8-72.5)	ANOVA(0.101)
Secondary	78.2(73.9-82.5)	ANOVA(<0.001*)
Vocational	55.9(31.8-9.9)	ANOVA(1.000)
Tertiary	83.3(80.2-86.5)	ANOVA(<0.001*)
Monthly income		
< ₦18,000	85.0(64.0-106.0)	Reference category
≥ ₦18,000	79.0(76.1-82.0)	ANOVA(1.000)
Occupation		
Professional	68.5(53.5-73.5)	ANOVA(1.000)
Agric. Worker	44.6(36.8-62.9)	Reference category
Public servant	58.2(43.9-68.3)	ANOVA(<0.001*)
Trading	75.9(71.8-89.9)	ANOVA(1.000)
Student	83.3(80.2-86.5)	ANOVA(<0.001*)
Retired	48.5(33.5-63.5)	ANOVA(1.000)
Unemployed	54.6(56.8-70.2)	ANOVA(0.301)
Others	62.2(53.9-72.5)	ANOVA(<0.001*)
Ethnicity		
Efik	60.9(53.3-78.4)	ANOVA(0.201)
Ekoi	70.2(68.0-77.4)	ANOVA(<0.001*)
Ibibio	79.7(75.6-83.7)	ANOVA(<0.001*)
Annang	82.8(78.1-87.6)	ANOVA(<0.001*)
Ibo	43.0(37.4-60.7)	Reference category
Others	70.9(53.3-88.4)	ANOVA(0.335)

3.2 Discussion

Overall, most of the study participants had good VRQOL, which is consistent with a previous institutional-based study in Ibadan, Nigeria (85.1%) [5]. Similarly, an institutional-based study in Ethiopia [17] reported good VRQOL in about 51% of the study participants. These were notably lower than in similar studies, however population-based, in Kenya and USA [19, 20]. Common among the institutional-based studies was the recruitment of "All consecutive patients (new and patients on follow up)". Thus, some of these participants had been on some medical care including counseling and rehabilitation sessions, which may have influenced their responses. Furthermore, this might be due to the instrument and administration method used to assess VRQOL. While the institutional-based studies used essentially same VRQOL tool (interviewer-administered NEI-VFQ-25 Question-naire), the Kenyan study employed the WHO/PBD VFQ20 and the study in USA employed self reported administration of the NEI-VFQ-25 Questionnaire. This might have introduced some psychometric variance among these studies.

Notably, the overall mean VRQOL was generally low for a study with higher proportion of study participants with MVI. The profound low scores from the blind subset must have played an impactful role in demeaning the overall mean VRQOL. In accordance with previous studies [21-25], this finding suggests that the degree of visual loss, consequently the visual acuity, was a significant predictor of VRQOL scores.

Similar to other studies, the VRQOL scores were low for participants with SVI and poor for those with blindness. This is understandably so, as visual acuity has been reported as the most significant predictor of VRQOL [21]. Our study has reaffirmed a consistent pattern of low VRQOL scores with poor VA, as found in other studies [21,26,27]. This is largely due to the fact that as the visual acuity decreases, daily activities are much more compromised thereby affecting social and economic status, increasing dependency and poor emotional wellbeing leading to poor VRQOL [21,28].

Comparable to other reports from Nigeria [29-33], and other African countries such as Rwanda [34], Ghana [35], Sudan [36], Tunisia [37],

Central African Republic [38], Niger [39], Cameroon [40], Kenya [41], Ethiopia [42] and in South Asia (i.e. Bangladesh, Pakistan, and India) [43-45], the common causes of visual impairment in this study, cataract, glaucoma and uncorrected refractive error, are avoidable (preventable and/or treatable). Moreso, the study participants with glaucoma were observed to have significantly poorer VRQOL scores. Some studies that undertook cause-specific analyses had similarly reported poorer VRQOL scores among participants with VI due to glaucoma [22,27].

Quite interestingly, participants with SVI had a mean VRQOL that was higher than the overall mean VRQOL score, further reflecting the fact that visual impairment alone may not explain low VRQOL scores. After controlling for VA, this study found that VF and QOL scores were significantly lower among specific groups. Significantly low mean VRQOL scores were observed among those who were older, rural dwellers, widowed, those who had no education, agricultural workers and Ibo ethnic group. This finding has been corroborated in previous studies [17,21,46], in which a range of factors such as gender, age, religious/cultural beliefs, marital status, place of residence, ethnicity, etc, influence VRQOL. The similar findings reiterate the interplay of psychosocial, environmental and cultural factors to VRQOL. Though poor visual health status influences an individual's QOL, the psychological, social and cultural milieu or disposition of such an individual also determines how far reaching the impact of the deviation from visual health. The psychosocial and economic milieu of some of these specific groups identified is characterized by socio-economic deprivation, increasing competing health co-morbidities, financial dependence, depreciating self esteem and poor socio-cultural orientation. For example, the psychological and emotional trauma of losing a spouse could lead to despair, loneliness and helplessness; similarly, rural dwellers are usually peasant farmers or traders with low financial capacity. The Ibo ethnic group is known for agility and high socio-cultural interactions. The impact of poor vision would be more debility amongst them, as it will limit these lifestyles.

There are some limitations to our study. Firstly, since NEI-VFQ-25 questionnaire was based on participants' responses, reporting bias could play a role, as participants may have under-reported or over-reported on some domains to interviewers. Secondly, the enrolment of participants into the study was by consecutive recruitment; which may have introduced some selection bias and may be responsible for the much greater number of patients in the category of blindness than that of severe visual impairment, which was not a common pattern in previous studies. Lastly, we did not collect data on coexisting bodily impairments (eg, hearing loss), coping style/strategies, social support and other aspects of visual functioning (contrast sensitivity, visual field, color vision, and stereo acuity). These could improve our understanding of factors affecting VRQOL.

4. CONCLUSION

The common causes of VI which negatively impact on the individual's VRQOL are largely avoidable, efforts should be exerted to reinforce early preventive and rehabilitative services which could remarkably improve the VRQOL outcomes of most visually impaired patients presenting to our clinic. Factors such as degree of visual loss, cause of visual loss, and socio-demographic factors eg. age, occupation, literacy level, ethnicity, readily influence VRQOL amongst visually impaired adult patients.

The authors therefore recommend that clinicians should be mindful of the cause of VI in the evaluation and care of patients with VI. We also recommend that eye care workers should consider incorporating the assessment of vision-related quality of life as an essential component of clinical assessment for visually impaired patients at presentation, at follow up visits and after appropriate treatment. Furthermore, patients with VI from glaucoma should be conscientiously managed due to the overbearing impact of VI on their VRQOL.

CONSENT

Informed consent was obtained from each respondent before interviewer administered NEI-VFQ-25 questionnaire.

ETHICAL APPROVAL

The study was conducted in accordance with the Declaration of Helsinki and ethical approval was obtained from the health research ethics committee of the University of Calabar Teaching Hospital UCTH/HREC/33/289.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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