# Patient reported outcomes of surgery for senile cataract in two hospitals in North-central, Nigeria


## ABSTRACT

**Aims:** This study assessed visual function (VF) and quality of life (QOL) post cataract surgery and their relationship with post operative presenting visual acuity (PPVA) in patients operated for senile cataract in two hospitals in Jos, North-central Nigeria.
**Study design**: A retrospective, hospital-based, cross-sectional survey
**Place and duration of study:** The study took place in the Eye units of the Bingham University Teaching hospital and the Faith Alive foundation Hospital both in Jos, North-Central Nigeria between June and august 2021.
**Methodology:** Patients aged 40 years and above, operated for senile cataract and were six weeks or more post-surgery were included in the study. Sociodemographic data and surgical history were obtained from patients and their surgical records. Visual acuity at presentation was assessed with available correction using Snellen's acuity and converted to LogMAR scale. A trained research assistant administered the VF-14 item and QOL-12 item questionnaires and responses scored using Fletcher's guidelines.Data was analysed with STATA version 16.0 using geometric mean, range, percentages and Spearman's rank test.
**Results:** Eighty-seven (69.6%) participants aged 40-104 years, mean of 67.2 ± 12.0 years with a male to female ratio of 1.1:1 were enrolled. Their mean PPVA was 0.6LogMAR (6/24) which improved to 0.3LogMAR (6/12). The mean total VF and QOL were 87.1% and 97.5% respectively. Depth perception (99.6%), visual perception and peripheral vision (94.2% each) scored the highest in the VF subscales. While mental wellbeing (97.9%) scored the highest in the QOL subscale, followed by social interaction (97.3%). There was a negative correlation between PPVA and mean total VF ($r_s$ = -0.4, P<0.0001) and QOL ($r_s$ = -0.3, P = 0.011).
**Conclusion:** In this study population, VF and QOL scores improved with increasing PPVA.



*Keywords: [Visual function, quality of life, cataract surgery}*


## 1. INTRODUCTION

Cataract surgery is an efficient, cost effective health intervention that is intended to restore patients vision, improve visual function (VF)/quality of life(QOL) and promote economic prodcutivity.[1,2,3,4,5] In recent past, the global emphasis has been on improving the cataract surgical coverage (CSC) and cataract surgical rate (CSR). However, because the quality of cataract surgery provided particularly in LMIC is not always optimal, equal attention needs to be given to not only improving the quantity but also the quality of cataract surgeries in developing countries.[6,7,8] Previously, assessment of cataract surgery outcomes has been mainly through the use of objective clinical measures such as post-operative visual acuity (PPVA) and refractive error (RE) which are easier and less time consuming to conduct in routine clinical practice. Evaluation of VF and QOL were often ignored, partly due to the assumption that they naturally will follow visual recovery. The current trend in outcome

assessment however, is to give equal attention to both clinical and patient reported outcomes (PROs) assessment. This combined approach is increasingly being adopted by researchers.[9,10] It is in recognition of this, that the WHO recommends monitoring of cataract surgical outcome through the use of vision-related quality of life tools alongside clinical evaluation, to provide a holistic assessment.[11]

Regrettably, there is still paucity of data regarding how clinical outcomes correlate with PROs from developing countries. Reliable evidence from LMIC identifying factors that cause clinical and PROs of cataract surgery to be less than ideal and the specific steps that can be taken to address these factors are insufficient. This study assessed the VF and QOL post cataract surgery in patients operated for senile cataract in two hospitals in Jos, North-central Nigeria and how they relate with post- operative presenting visual acuity (PPVA). Investigating the results of cataract surgery on both clinical and PROs is useful in exploring the full benefits of cataract surgery and has the potential to improve the overall quality of cataract surgical services in developing settings.

## 2. MATERIAL AND METHODS

The study was conducted in two faith-based hospitals in Jos, Nigeria between June and August 2021 over a six weeks period.

It was a retrospective, hospital-based, cross- sectional study involving patients who had been operated for senile cataract in the preceding18 months and were six weeks or more post-operatively. Those excluded from the study were patients above 40 years with Secondary or complicated cataract, who had second cataract surgery, combined procedure, were aphakic, residing outside of Jos at the time of the study, whose telephone contacts could not be retrieved from their case notes or who declined consent.
Eligible participants were identified from the surgical registers of each facility and invited for recruitment on a specified date by an ophthalmic nurse via telephone calls.At presentation, all participants were administered the patient information sheet and informed consent, interviewed to obtain their sociodemographic data and surgical history retrieved from their surgical records.

### 2.1 Patient reported outcomes assessment

The adopted Visual function (VF) /quality of life (QOL) questionnaires were administered by a trained research assistant. The VF-14 item and QOL-12 item questionnaires initially developed in India, used for a clinical trial of cataract surgery outcomes and has been validated and used by authors in several other LMIC including Nigeria.[1,12,13,14] The VF-14 item questionnaire measures visual capacity in five subscales; general vision, visual perception, peripheral vision, sensory adaptation and depth perception. The QOL-12 item questionnaire assesses the difficulties individuals face in everyday life because of visual loss using four subscales; selfcare, mobility, social function and mental wellbeing. First, the total cumulative score for each subscale was calculated and expressed as a percentage of the maximum possible score. Scores across all the subscales were then added together to obtain the overall VF and QOL scores. The higher the value of the score, the better the VF/QOL. Conversely, the lower the value of the score, the poorer the QOL/VF. The final score for both questionnaires was produced using the scoring system which range between 0 (unable to do all applicable activities) to a maximum of 100 (able to perform activity with no difficulty at all) using the Fletcher's guideline.[14]

### 2.2. Clinical outcome assessment

Thereafter, all patients underwent post operative presenting visual acuity (PPVA) assessment with available correction by an ophthalmic nurse and best corrected visual acuity (BCVA) assessment by an optometrist. Full details of PPVA and BCVA assessment protocol has been elaborated in another publication related to this study.[15] The PPVA assessed using Snellen's acuity was converted to LogMAR scale by taking the log to the base of 10 of the reciprocal of the Snellen's acuity fraction for the purpose of statistical analysis and comparison with similar studies.[12,16]

### 2.3 Data analysis

Data was entered into Microsoft excel spreadsheet, imported into STATA version 16.0 (Stata Corp, College Station, TX, USA) for analysis using frequencies. geometric mean, percentages, Wilcoxon Sign Ranked test and Spearman's Rank test. At all instances, 2-sided P value set at 0.05 was regarded as statistically significant for all variables of interest.

## 3. RESULTS AND DISCUSSION

### 3.1 Results

A total of 125 patients were eligible for the study, of which 87 were enrolled giving a response rate of 69.6%. Their mean age was 67.2 ± 12.0 years with a male to female ratio of 1.1:1. Majority of the participants were married (57, 65.52%), had no formal education (52, 59.77%), were urban dwellers (65, 74.71%), not living alone (86, 98.85%) and engaged in petty trading (31, 35.63%). See Table 1.

**Table1: Socio-demographic characteristics of study participants**

| Socio-demographic characteristic | Frequency (%) n = 87 |
|---|---|
| **Age group (years)** | |
| 40-50 | 6(6.90%) |
| 51-60 | 19 (21.84%) |
| 61-70 | 37 (42.53%) |
| 71-80 | 16 (18.39%) |
| 81+ | 9 (10.34%) |
| **Sex** | |
| Male | 46 (52.87%) |
| Female | 41 (47.13%) |
| **Marital status** | |

| | |
|---|---|
| Single | 1 (1.15%) |
| Married | 57 (65.52%) |
| Divorced | 3 (3.45% |
| Separated | 0 (0.00%) |
| Widowed | 26 (29.90%) |
| **Literacy level** | |
| Primary | 21 (24.14%) |
| Secondary | 5 (5.75%) |
| Tertiary | 9 (10.34%) |
| Non-formal | 52 (59.77) |
| **Employment status** | |
| Civil/public servants | 4 (4.60%) |
| Farmers | 9 (10.34%) |
| Traders | 31 (35.63%) |
| [a]Skilled laborers | 9 (10.34%) |
| [b]Unskilled laborers | 17 (19.54%) |
| Retirees. | 17 (19.54%) |

*[a]Skilled laborers include carpenters, seamstresses, builders and drivers, [b]Unskilled laborers include house wives and janitors.*



The Mean post operative presenting visual acuity (PPVA) was 0.6 LogMAR (6/24) which improved to 0.3 LogMAR (6/12) after refraction (best corrected visual acuity; BCVA) which was significant by the Wilcoxon Sign Ranked test (Z=7.7, *P*<.001).

The geometric Mean total VF and QOL were both above 80% while the scores for the subscales were all greater than 70%. However, QOL scores were generally higher than those of VF in all domains with self-care as the only subscale to score 100% for all participants. Two patients were not ambulant and three did not engage in social activities for reasons other than vision and so were excluded from the analysis in the respective subscales as presented on table 2.

**Table 2: Mean post-operative visual function and quality of life scores of study participants in percentage**

| Patient reported visual outcome | | Number | Geometric Mean | 95% confidence interval | |
|---|---|---|---|---|---|
| | | | | Lower limit | Upper limit |
| VF[a] subscales | General VF | 87 | 73.0516 | 69.7464 | 76.5135 |
| | Visual perception | 87 | 94.1505 | 91.1134 | 97.2889 |
| | Peripheral vision | 87 | 94.15054 | 91.1134 | 97.2889 |
| | Sensory adaptation | 87 | 79.71435 | 76.2531 | 83.3328 |
| | Depth perception | 87 | 99.5703 | 98.8910 | 100.2542 |
| | Total VF | 87 | 87.1191 | 85.2738 | 89.0044 |
| QOL[b] subscales | Self-care | 87 | 100.0000 | 100.0000 | 100.0000 |
| | Mobility | 85 | 96.1613 | 93.9962 | 98.3762 |
| | Social interaction | 84 | 97.3251 | 94.7972 | 99.9205 |
| | Mental wellbeing | 87 | 97.8944 | 95.9048 | 99.9253 |
| | Total QOL | 87 | 97.52183 | 96.1553 | 98.9278 |

[a]*Visual function,* [b]*quality of life*

Spearman's correlation analysis of the relationship between PPVA with VF and QOL in the total and subscales showed a negative correlation between PPVA and mean total VF ($r_s$ = -0.4, *P*<0.001) and mean total QOL ($r_s$ = -0.3, *P*= .01) which where statistically significant. Similar results were obtained for the relationship between PPVA with VF and QOL across all subscales with the exception of depth perception where a statistically insignificant positive correlation was recorded. All patients scored 100% in the selfcare domain hence, no correlational analysis was performed for that domain. Details on Table 3.

**Table 3: Spearman's correlation of post-operative presenting visual acuity with visual function and quality of life**

| Patient reported outcome | Spearman's correlation | *P* value |
|---|---|---|

| | | Coefficient ($r_s$) | |
|---|---|---|---|
| VF[a] sub-scale | | | |
| | General VF | -0.4857 | <.001[c] |
| | Visual perception | -0.3240 | .002[c] |
| | Peripheral vision | -0.0235 | .823 |
| | Sensory adaptation | -0.3319 | .002[c] |
| | Depth perception | +0.0408 | .707 |
| | Total VF | -0.4331 | < .001[c] |
| QOL[b] subscale | | | |
| | Self-care | - | - |
| | Mobility | -0.3130 | .004[c] |
| | Social interactions | -0.2234 | .041[c] |
| | Mental well being | -0.2316 | .031[c] |
| | Total QOL | -0.3447 | .011[c] |

[a]*Visual function,* [b]*quality of life,* [c]*statistically significant*



## 3.2 Discussion

In this study of clinical and patient reported outcomes (PROs) of surgery for senile cataract, visual function (VF) and quality of life (QOL) scores improved with increasing post operative PVA (PPVA).

The mean total post-operative VF score of 87.12% and mean total QOL score of 97.52% in our study population is much higher the 58.3% and 60.5% reported by Odugbo[17] in an earlier study in Jos, 47.5% and 55.4% reported by Pokharel[18] in Nepal for VF and QOL respectively. Several longitudinal studies conducted using similar PROs tools as the current study, reported huge improvements in VF and QOL scores following cataract surgery.[18,12,17,16] Conventionally, PROs results focus on change in scores after an intervention. Although our study was not designed to measure change in VF/QOL, surveys assessing single measurement of VF/QOL score like ours are not uncommon and have generated useful evidence needed to improve outcome of cataract surgery.[19,20]

The high post operative VF and QOL scores recorded among our study population despite the average visual outcome being in the moderate visual impairment category (6/24) is not unexpected. Because the threshold for cataract surgery in our research facilities like in many LMIC is frequently severe visual impairment or cataract blindness, cataract operated patients' in LMIC settings are more likely to report larger changes in VF and QOL compared to those in settings where the threshold for cataract surgery is higher.[19,17,21] Additionally, the visual needs of our study population is likely to be low due to low literacy level and less

visually demanding occupation and lifestyle. Similarly, findings of the Nigerian blindness and visual impairment survey revealed that rural dwellers and non-literates were more likely to score lower than urban dwellers and literates on VF/QOL.[19]

This study found that average total VF/QOL scores of participants were higher with decreasing PPVA in LogMAR scale. Similar trend was observed in majority of the subscales. Similarly, Tran[19] et al also found a negative correlation between total VF/QOL in all subscales scores with PVA, $r_s$ranging from (-0.5 to -0.6) and (-0.3 to -0.5) for VF/QOL respectively. They concluded that PPVA was the most significant predictor of VF/QOL, an aspect we did not evaluate in our study. But is at variance with reports from some others authors who found a positive correlation between PPVA and mean VF/QOL scores.[12,16] The observed variation is likely due to differences in the scoring and interpretation of VF/QOL scores between studies. Where surveys that reported negative correlation interpreted increasing scores as improvement in VF/QOL while those with positive correlation interpreted increasing scores as decrease in VF/QOL. Overall, all studies agreed that as vision improved, VF/QOL also improved.

## 4. CONCLUSION

Mean total VF and QOL scores and scores across all subscales of the study population were high and improved with increasing PPVA. The use of PRO measures alongside clinical outcome evaluation provides a holistic assessment of the full benefits of cataract surgery.

## CONSENT

All authors declare that written informed consent was obtained from all eligible participants for recruitment into the study and for publication of the results of the study. Participation was fully voluntary and at all times, the tenets of the declaration of Helsinki for research involving human subjects was upheld.

## ETHICAL APPROVAL

Ethical approval for the study was obtained from the research ethics and review board of Bingham University Teaching Hospital and the Faith Alive foundation Hospital Jos, North-Central, Nigeria.

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## ABBREVIATIONS

CSC- cataract surgical coverage
CSR- Cataract surgical rate
BCVA- Best corrected visual acuity

LogMAR- logarithm of the minimal angle of resolution
LMICS- Low- and middle-income countries
PPVA- Post operative presenting visual acuity
WHO- World Health Organization
QOL- quality of life
RE- refractive error
VF-visual function