

# The effect of ophthalmic surgery on quality of life, depression, and anxiety disorders in visually impaired adults, National Eye Center, Kaduna, Nigeria.

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## Research article

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1 **The effect of ophthalmic surgery on quality of life, depression, and anxiety disorders in**  
2 **visually impaired adults, National Eye Center, Kaduna, Nigeria.**

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24 **Abstract**

25

26 **Introduction:** Visual impairment caused severe disability in 2.2 billion people globally in  
27 2010. This disability, which interacts with the physical, social, or attitudinal environment,  
28 spans across the lifecycle, and is associated with psychological distress and poor quality of  
29 life. This study aimed at describing the effect of surgery on blindness, QoL, anxiety and  
30 depressive disorders.

31 **Methods:** A one arm pre – post study was conducted among systematically-selected visually  
32 impaired adults (> 18 years) requiring surgery at the National Eye Centre (NEC), Nigeria.  
33 Trained research assistants used a pre-tested semi-structured questionnaire to interview  
34 participants at pre – and 10 - 12 week’s post-surgery. The visual function was measured with  
35 presenting visual acuity. Presence of psychological distress was defined by a scores  $\geq 8$  on  
36 the Hospital Anxiety and Depression scale (HADs), and confirmed the presence of anxiety,  
37 and depression using Mini International Neuropsychiatric Interview (MINI) questionnaire.  
38 The World Health Organization Quality of Life-Bref questionnaire was used to assess the  
39 quality of life. Descriptive analysis for frequency and proportions was carried out while Chi  
40 square McNemar test used to detect the effect of surgery on blindness, anxiety, depression  
41 and QoL. Statistically significant was set at p Value < 0.05.

42 **Results:** Of the 180 respondents, males accounted for 56.7%, and 72.2% had Cataract. Pre-  
43 surgical psychological distress, anxiety and depression were 38.9%, 25.6%, and 30.0%,  
44 respectively. Pre-surgery, a third had poor QoL on social relationship domain of WHOQoL-  
45 Bref. Ophthalmic surgery significantly improved blindness, anxiety, and social relationship  
46 QoL. No significant effect on depression.

47 **Conclusions:** Ophthalmic surgery influences social relationships QoL, and anxiety. It  
48 however has no effect on depression. Apart from surgical interventions, holistic care of vision  
49 impairment should involve mental care to improve QoL.

50 **Keywords:** Visual impairment, anxiety, depression, Quality of life, anxiety, depression,  
51 Ophthalmic surgery, WHOQoL-Bref

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76 **Background Information**

77 Globally, of the 2.2 billion people with vision impairment or blindness in 2010, 1 billion  
78 cases were preventable [1]. The commonest causes of vision impairment were cataract,  
79 refractive error, and glaucoma [2]. This vision impairment causes severe disability in  
80 interacting with the environment which could be physical, social, or attitudinal [1]. The  
81 consequences of vision impairment span across the lifecycle and its severity depends on the  
82 age of occurrence. As reviewed in the World's Report on Vision in 2010, the consequences  
83 of vision impairment in adults with vision impairment are associated with poor quality of life  
84 (QoL) [3], lower rates of workforce participation and productivity, and higher rates of  
85 depression and anxiety when compared to the general population [1].

86 Vision impairment is a major life change best managed with medical and surgical  
87 interventions [4, 5] but many countries and individual with vision impairment are facing  
88 significant eye care challenges [1]. Other challenges of visually impaired persons are  
89 accessibility to appropriate healthcare services, cost of treatment and its affordability,  
90 adequate skilled health workers, acceptability of the disability caused by the impairments,  
91 burdens on the immediate family and friends, and a high risk of having psychological distress  
92 [6] which may be pronounced if surgical intervention is required [4,5,7].

93 Vision function-specific distress has been reported as a direct predictor of common  
94 psychiatric disorders [8, 9]. Common psychiatric disorders reported in adults with vision  
95 impairment are anxiety and depression [4, 10, 11]. In addition, other factors associated with  
96 common psychiatric disorders among visually impaired adults requiring ophthalmic surgery  
97 include those inherent with surgical treatment, fear of the unknown outcome of the surgery,  
98 fear of losing visual functions, inadequate information about the cause of the visual  
99 impairment, inability to pay for the surgical operation, ongoing psychosocial problems that

100 result from or get worse with the presence of visual impairment, frequent and multiple  
101 hospital visits, cost of drugs and use of transportation systems [10,12,13].

102 The effect of co-morbidity between common psychiatric disorders and visual impairment  
103 may influence the QoL of the visually impaired adults [14], and on the other hand, surgical  
104 interventions have been associated with the presence or absence of common psychiatric  
105 disorders and the worsening of QoL [5, 15 ,16]. This influence can be attributed to the  
106 individual reactions to surgical outcome, as failure to meet self-perceived expectations may  
107 potentiate psychological disorders and worsen the QoL [17]. Furthermore, the presence of  
108 postoperative complications like macular oedema, intraocular haemorrhages and  
109 postoperative emmetropia which obstructs visual acuity may worsen visual functions and  
110 activates the presence of common psychiatric disorders and by extension the QoL [3].

111 The preoperative prevalence of common psychiatric disorders in adults ranges from 34.4% to  
112 51.0% in Nigeria, [15,18] and may be as high as 70% or more as reported in Ethiopia and Sri  
113 Lanka [7,15,19]. The high prevalence is due to several factors such as the age of onset of the  
114 visual impairment, antecedent socioeconomic ability of the individual, cause of visual  
115 impairment, treatment modalities, associated psychosocial problems, the severity of visual  
116 impairment, and associated age-related comorbidities. Despite the fact that psychiatric  
117 disorders are common in surgical patients, surgeons are less likely to identify them or refer  
118 them to psychiatrists [20], but rather perform the surgical operation with the hope that the  
119 psychiatric disorders will be resolved following surgery. Therefore, the presence of common  
120 psychiatric disorders among the visually impaired is not diagnosed by the ophthalmologist  
121 [20].

122 In Northern Nigeria, a high prevalence of low vision and blindness exists [21] and many  
123 visually impaired adults attend the National Eye Centre (NEC) - the only eye research

124 institute in Nigeria. Few studies from Northern Nigeria on the effects of surgical intervention  
125 on the prevalence of common psychiatric disorders and QoL of visually impaired adults are  
126 reported. Therefore, this study aimed to describe the characteristics and clinical presentations  
127 of visually impaired adults requiring ophthalmic surgery at NEC, and explore the effect of  
128 surgery on blindness, common psychiatric disorders, and QoL.

## 129 **Methods**

### 130 **Study settings**

131 The study was conducted at the National Eye Centre (NEC), Kaduna, Kaduna State, North-  
132 Western Nigeria. NEC is the only eye research centre in Nigeria. It has 100 beds, 10  
133 consultant clinics, 7 operating theatre suites and other specialized subunits. It receives  
134 patients from all over the country and neighbouring West Africa countries and runs 3 clinics  
135 in a day with about 50 to 70 patients attending each clinic and the total average of about 150 -  
136 200 patients per day. The clinics are Glaucoma/Cataract, Vitreoretinal, Oculoplastic,  
137 Paediatrics, Anterior Segment and Cornea. The clinics are all divided into sub-specialized  
138 areas to attend to cataract patients. Generally, an average of 200 visually impaired persons are  
139 operated on monthly in this health facility.

### 140 **Study Design**

141 This is a before and after longitudinal study design where visually impaired adults, booked  
142 for elective surgery, were assessed for psychiatric disorders and QoL before the surgery and  
143 10 – 12 weeks after surgery.

### 144 **Sample Size**

145 Using a formula for two proportions derived from the general formula of Lwanga and  
146 Lemeshow [22], the probability of visually impaired adults having common psychopathology  
147 preoperatively is 0.65 [23], and post-ophthalmic surgery is 0.58 [23]. The hypothetical level

148 of clinical significance is set at 20% i.e. 0.2, power is set at 80% and  $\alpha = 0.05$ . With finite  
149 population correction and anticipated loss to follow up or attrition rate of 10% as 8.8%  
150 reported after 1 year follow up in a similar study [23]. Therefore, the minimum sample size  
151 for this study is 180.

## 152 **Study Population**

153 The population was visually impaired adults with a presenting visual acuity of less than 6/18  
154 in any eye-requiring surgical intervention from February 2016 to May 2016 at NEC, Kaduna.  
155 For eligibility, the visually impaired adults should be 18 years or more, presenting with a  
156 visual acuity of <6/18 in at least one eye as confirmed by the ophthalmologist, booked and  
157 admitted for surgical intervention at the NEC, Kaduna. Participants had to consent to a three-  
158 month follow-up. Anyone with history or evidence of cognitive impairment like dementia,  
159 altered consciousness, hearing impairment and other conditions that could hinder interview,  
160 such as a lifetime history of psychiatric disorders prior to the onset of visual impairment was  
161 excluded.

## 162 **Sampling Technique**

163 The sampling frame was a comprehensive surgical operation list generated for visually  
164 impaired adults booked and admitted for surgery daily. From previous NEC surgical data, the  
165 average number of visually impaired adults having surgical intervention in a month was 200,  
166 therefore 800 for the four-month recruitment period. Eligible individuals were selected using  
167 a systematic random sampling, with this formula;  $K^{th} = \frac{N}{n}$ ; where  $K^{th}$  is the interval of  
168 sample selection. N is the total population (800) and the sample size is n (180). Therefore, the  
169 interval  $K^{th}$  is 4, and the first sample was randomly selected between one and four.  
170 Thereafter every fourth eligible individual that met inclusion criteria were recruited until the  
171 required sample size was achieved.

172 **Data collection tools**

173 **Social demographic questionnaire:** This was used to collect characteristic data such as age,  
174 gender, marital status, religion, ethnicity, level of education, occupation, current and past  
175 employment status, source of income, average monthly saving, place of residence and whom  
176 the individuals were living with. The second part of the questionnaire sought information on  
177 the source(s) of social and financial support, age at onset of visual impairment, duration of  
178 illness before presentation at NEC and family history of mental disorder and who do  
179 participants lived with. In the second part, duration of eye problem, place(s) of eye treatment,  
180 source of referral to NEC, duration of attendance at NEC, if attending Surgeon gave  
181 information of need for eye surgery and when a major source of support for the treatment,  
182 history of other chronic medical illness like hypertension, diabetes, thyroid enlargement,  
183 kidney disease, HIV/AIDs, cancer and cardiovascular disease, past surgical history, and  
184 family history of mental illness. The presenting visual acuity (PVA) for each eye as measured  
185 by the ophthalmologist and vital signs reported in the individual health records were also  
186 recorded.

187 **Hospital Anxiety and Depression Scale/HADs:** The hospital anxiety and depression scale  
188 (HADs) developed by Zigmond and Snaith in 1983 is a 14-item instrument, with 4-point  
189 verbal rating scales ranging from 0 to 3 designed to detect the presence and severity of  
190 depression and anxiety in non-psychiatric settings. It consists of seven items each for anxiety  
191 and depression, rated on a four-point scale of severity by the respondents according to how  
192 they felt during the previous week. They can be self, or interviewer-administered. A score of  
193 8 and above in either anxiety or depression domain of HADs or both combined were  
194 considered to suffer from psychological distress and were subjected to further psychiatric  
195 evaluation, while those with scores of less than 8 in both subscales were normal. HADs is

196 useful to assess the impact of physical illness on the psychological wellbeing of the  
197 individual as it is devoid of somatic symptoms. It has been validated in Nigeria for use with  
198 primary care patients and the general population with no difference to the original [10, 24].

199 **The Mini International Neuro-Psychiatric Interview (DSM-IV) M.I.N.I Plus:** The  
200 M.I.N.I. Plus [25] was designed as a brief structured interview for diagnosis of the major  
201 Axis 1 Psychiatric disorder in DSM IV and ICD10. It has acceptably high validity and  
202 reliability scores with an added advantage that it can be administered in a much shorter time  
203 (mean  $18.7 \pm 11.6$  minutes, median 15 minutes) when compared with Structured Clinical  
204 Interview for DSMR – III R (SCID), the Composite International Diagnostic Interview  
205 (CIDI), the Diagnostic Interview Schedule (DIS) and the Present State Examination (PSE).  
206 After a brief training session clinician can use it but lay interviewers require more extensive  
207 training. The questions are rated Yes or No, and clinical judgment of the interviewer is used  
208 in coding the responses. This instrument has been validated in many countries and used in  
209 Nigeria [21, 25]. Depression and general anxiety disorder modules were used in this study  
210 and only administered to those with probable psychiatric disorders positively screened with  
211 HADs. The depression module seeks symptoms of depression lasting two weeks in the past  
212 and current. Also, asked for a family history of bipolar disorder or use of mood stabiliser. It  
213 rules out causes like bereavement, substance-induced, medications, medical illness and other  
214 organic causes. The module for general anxiety asked for past and current symptoms of  
215 anxiety in the last six months significant to impair daily functioning and rules out organic  
216 causes and use of psychoactive substances.

217 **World Health Organization Quality of Life – Bref:** The WHO group define Quality of Life  
218 (QoL) [26] as the “individual’s perception of their position in life, in the context of the  
219 culture and value system in which they live and about their goals, expectations, standards and

220 concerns". It is a broad-ranging concept affected in a complex way by the persons' physical  
221 health, psychological state and level of independence, social relationships, and relationship to  
222 salient features in their environment. It is a subjective perception and means different things  
223 to different people. QoL is lower in visually impaired [27], and this could worsen psychiatric  
224 comorbidity [28]. World Health Organization Quality of Life Scale – Brief Version (WHO  
225 QOL – BREF) which is a 26-item self-administered generic questionnaire was used in this  
226 study. It is a short version of the WHO QoL – 100 scales [27] The WHO QoL – BREF is an  
227 international quality of life instrument which produces a profile with four domain scores:  
228 physical health (7 items), psychological health (6 items), social relationships (3 items),  
229 environmental domain (8 items) as well as two separately scored items about the individuals'  
230 perception of their quality of life (Q1) and health (Q2). Each item was scored in a Likert  
231 format from 1 to 5. Scores are scaled in a positive direction (with higher scores denoting the  
232 higher quality of life) and summed. It has been validated and used in Nigeria [28, 29]. Using  
233 the guideline, the items were added to get the domain raw score and the mean score of these  
234 items calculated. To transform to 4-20 score, the domain mean scores were multiplied by 4 to  
235 make domain scores comparable with the scores used in the WHOQoL-100. Otherwise, with  
236 this formula,  $\left[ \frac{\text{Actual raw score} - \text{lowest possible raw score}}{\text{Possible raw score range}} \right] \times 100$  the domain raw score is  
237 transformed linearly into 0 – 100 scale which was used for statistical analyses [30]. Domain  
238 scores are scaled in a positive direction with higher scores denotes higher or better QoL.

### 239 **Visual acuity measurement**

240 This is the most significant predictor of total visual function score [31]. It is a standard  
241 adopted by the International Council of Ophthalmology to compares the performance of each  
242 persons' eye [32]. Although, an objective clinical measure of visual function, it cannot reflect  
243 on how visual impairment affects activities of daily living (ADL) [33]. This is important

244 where psychiatric disorders associated with loss of visual functions precipitate poor QoL and  
 245 its sequelae in the management of visual impairments. Visual impairment defined in the  
 246 International Statistical Classification of Diseases and Related Health Problems, tenth  
 247 revision (ICD-10) [31] is best-corrected visual acuity measured with or without glasses of  
 248 less than 6/18. For this study, presenting visual acuity (PVA) rather than best-corrected visual  
 249 acuity of less than 6/18 in any eye as recorded by the Ophthalmologist was used to identify  
 250 those with visual impairment and recruited into the study. PVA is more encompassing and  
 251 reflects visual functioning as regard to ADL rather than corrected best eye visual acuity. PVA  
 252 was assessed with a Snellen chart hanged six meters away from the subject in a well-  
 253 illuminated area. For the illiterate subjects, the tumbling E chart was used. At the extreme  
 254 loss of visual function that cannot be assessed by visual acuity counting of fingers or hand  
 255 movement at one meter and light, the perception was used.

256 For the purpose of this study the average presenting visual acuity (PVA) of both eyes were  
 257 used and categorized according to WHO definition of low vision and blindness as shown in  
 258 Table 1.

259 Table 1: WHO definition of Low Vision and Blindness

Category	Presenting Visual Acuity	WHO Standard Definition	WHO Working Definition
0	6/6 to 6/12	Normal	Normal
1	< 6/12 to $\geq$ 6/18	Mild visual impairment	Low vision (mild)
2	< 6/18 to $\geq$ 6/60	Moderate visual impairment	Low vision (Moderate)
3	< 6/60 to $\geq$ 3/60	Severe visual impairment	Low vision (Severe)
4	< 3/60 to $\geq$ 1/60	Blind (CF, HM)	Profound
5	< 1/60-PL	Blind	Near blindness
6	NPL	Blind	Total blindness

260 CF= Count Finger, HM= Hand Movement, PL= Perception to light; NPL= No perception to  
 261 light.

262 This was calculated from the metric notation of Snellen Acuity that was converted to decimal  
 263 notation and the negative logarithm of this decimal notation yielded the logarithm of

264 Minimum Angle of Resolution (log MAR) equivalent [34]. The use of log MAR for average  
265 PVA is appropriate for VA measurements for research and population studies. It is recorded  
266 in a numerical format making scoring and analysis simple [35 - 38]. For those with PVA of  
267 less than 6/120 or 20/400 vision, recorded as Count Fingers (CF), Hand Motion (HM) both  
268 usually taken at one-meter, Light Perception (LP), or No Light Perception (NLP). Visual  
269 acuity of 6/600 or 20/2000, 6/1200 or 20/4000, 6/2400 or 20/8000 will be recorded for CF,  
270 HM and LP or NLP, respectively [37].

### 271 **Data Collection Methods**

272 The researcher and the research assistant were trained by a consultant psychiatrist on the use  
273 of WHOQoL-Bref, HADs, and MINI questionnaires. The questionnaire was pre-tested  
274 among 15 visually impaired adults to determine its acceptability, clarity and comprehension  
275 by the interviewer and interviewee as well as to determine the administration time. Problems  
276 identified during the pre-test period were corrected and subjects used in the pre-test were not  
277 included in the study.

278 Eligible visually impaired adults requiring ophthalmic surgery were interviewed on the day of  
279 admission before surgery by a trained research assistant who was a junior psychiatric resident  
280 doctor. The interviewer obtained informed consent from the participants and obtained  
281 information on their sociodemographic characteristics, quality of life using WHOQoL-Bref  
282 and screened for psychological distress using HADs. Those that were screened positively to  
283 HADs were further interviewed with the depression and anxiety module of the Mini  
284 International Neuro-psychiatric Interview (DSM-IV) (MINI) to diagnose anxiety and  
285 depressive disorders. Thereafter, the health records of participants were reviewed for those  
286 presenting visual acuity, vital signs, ophthalmic diagnosis, and type of surgery as documented  
287 in the health records by the Ophthalmologists.

288 Participants were seen at one week after surgery at the clinic and reinforced their  
289 commitment to being followed up for 3 months and gave permission to be called on phone to  
290 be reminded of the visit for the second interview. At 10 – 12 weeks post-surgery, similar  
291 questionnaires and modalities of administration as done at the pre-surgical phase were carried  
292 out. Those that were lost to follow-up were not substituted. But participants with significant  
293 psychiatric morbidity as diagnosed by MINI were referred to the psychiatric hospital for  
294 assessment and management.

### 295 **Data analysis**

296 Dependent variables were the presence of psychiatric disorders and QoL. Independent  
297 variables were respondents' characteristics, the existence of chronic diseases, duration of the  
298 ocular disorder, sources of support etc., Domains of WHOQoL-Bref were dichotomised into  
299 poor and good for analysis using the 25<sup>th</sup> percentile as cut off as used in previous literature  
300 [39, 40]. Therefore, participants with  $\leq 25^{\text{th}}$  percentile were classified as poor QoL. Data  
301 were entered into Epi Info <sup>TM</sup> Database and Statistics Software for public health  
302 professionals, Version 3.3.2 and Statistical Package for the Social Sciences (SOSS) version  
303 20.0 for analysis.

304 Descriptive analyses like frequencies, proportions and percentages were calculated, Chi-  
305 square McNemar test and odds ratio were used for test of association between categorical  
306 paired samples. Significant variables at bivariate analysis were further subjected to linear  
307 mixed model to estimate fixed and random coefficients of a paired sample. Initially, the  
308 model began with fitted independence linear fixed model followed by a random intercept  
309 model with the assumption that covariance structures has heterogenous variances and zero  
310 correlate between elements. The random model implies that variances at different time points  
311 are equal and covariance between each pair of time points are equal. The random intercept  
312 and slope model used to check any improvement in the fit over the model and based on the

313 Akaike's Information Criterion (AIC) the final model chosen to describe the dependent  
314 outcome variables to include random intercept for subjects and fixed effects for explanatory  
315 variables. Level of significance for analysis was set at  $p < 0.05$ , and 95% confidence interval.

## 316 **Results**

### 317 **Respondents' characteristics**

318 Of the 180 participants recruited, 174 (96.7%) completed the study and 3.3% were lost to  
319 follow up (LTFU). Table 1 shows the demographic characteristics of the participants. The  
320 median (range) age was 62 (20 – 99) years, age group > 59 years were 62.2%, male were  
321 56.7%, 84.4% were married, and 35% had no form of education. Of the 180 respondents,  
322 61.7% were living with their spouses and 26.1% with their children. The family was the main  
323 source of support for 84.4%, and initiate care seeking for eye care at NEC for 55.0%, while  
324 health workers motivated and referred 16.7%, but 21.7% sought care at NEC by themselves.

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331 Table 1: Demographic characteristics of the visually impaired adults for ophthalmic surgery,  
332 NEC Kaduna Nigeria. (n = 180)

<b>Characteristics</b>	<b>Frequency (n=180)</b>	<b>Percentage (%)</b>
<b>Age group (Years)</b>		
<30	10	5.6

30 – 39	10	5.6
40 – 49	12	6.7
50 – 59	36	20.0
60 – 69	69	38.3
70 – 79	32	17.8
>79	11	6.1
<b>Sex</b>		
Female	78	43.3
Male	102	56.7
<b>Marital status</b>		
Married	152	84.4
Widowed/Separated	18	10.0
Single	10	5.6
<b>Religion</b>		
Christian	80	44.4
Islam	100	56.6
<b>Level of education</b>		
None	63	35.0
Qur’anic	22	12.2
Primary	38	21.1
Secondary	35	19.4
Post-secondary	22	12.2
<b>Geopolitical Zone</b>		
N/W	93	51.7
N/Central	39	21.7
N/East	17	9.4
S/E	15	8.3
S/S	8	4.4
S/W	8	4.4
<b>Ethnicity</b>		
Hausa	60	33.3
Fulani	21	11.7
Igbo	18	10.0
Yoruba	16	8.9
Others	65	36.1

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### 336 **Clinical History of Respondents**

337 In Table 2, clinical information of the 180 respondents showed that 72.8% had cataract; the  
338 current treatment was the first eye treatment for 62.8%; 50.5% had vision impairment for >  
339 12 months; and 94.4% had been informed of surgical interventions for the eye disorders.

340 Table 2: Clinical history of the visually impaired adults for ophthalmic surgery, NEC Kaduna  
 341 Nigeria. (n = 180)

<b>Characteristics</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Duration of eye problem</b>		
<7 months	33	18.3
7 - 12 months	56	31.1
>12 months	91	50.6
<b>Clinics or departments</b>		
Anterior segment & Cornea	45	25.0
Cataract/Glaucoma	44	24.4
Oculoplastic	36	20.0
Paediatrics	35	19.4
Vitreoretinal	20	11.1
<b>Duration of clinic attendance</b>		
< 1 months	49	27.2
1 - 6 months	73	40.6
7 - 12 months	29	16.1
>12 months	29	16.1
<b>Diagnosis</b>		
Cataract	131	72.8
Glaucoma	16	8.9
Tumour	8	4.4
Corneoscleral Scar/abscess	7	3.9
Pterygium	6	3.3
Pseudo phakia	4	2.2
Ruptured Lens	4	2.2
Others**	4	2.2
<b>Type of surgery</b>		
SICS+PCIOL*	133	73.9
Trabeculectomy	16	8.9
Others	31	17.2

342 \*Small Incision Cataract Surgery with Posterior Chamber Intraocular Lens

343 \*\*Others: Iris prolapse (2), Chemical burns (2)

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345 Only 23.9% had previous experience of any surgical procedure and 37.2% (67/180) had

346 comorbid medical conditions. Common comorbid medical conditions among the 67

347 respondents were hypertension (58.2%), diabetes mellitus (10.4%), thyroid enlargement

348 (4.5%), erectile dysfunction (1.5%), rheumatism (1.5%), and peptic ulcer disease (1.5%).

### 349 **Effect of surgery on blindness and prevalence of common psychiatric disorders**

350 Ophthalmic surgery reduced the proportion of respondents with blindness at pre-surgery from

351 47.8% (86/180) to 30.0% (54/174) post-surgery and this was significant with McNemar test,  
 352  $p = 0.001$  as shown in Table 3.

353 Table 3: Association and effect of ophthalmic surgery on blindness, psychological distress,  
 354 depression and anxiety disorders among visually impaired adults, NEC Kaduna Nigeria.  
 355 (n=174)

<b>Blindness</b>	<b>Post – surgery Blindness</b>		<b>Total</b>	<b>OR (95% CI)</b>	<b>McNemar</b>
<b>Pre-surgery</b>	<b>Yes</b>	<b>No</b>			
Yes	34 (41.0))	49 (59.0)	83 (48.0)	2.5 (1.3 - 4.8)	0.001*
No	20 (22.0)	71 (78.0)	91 (52.0)		
<b>Total</b>	<b>54 (31.0)</b>	<b>120 (69.0)</b>	<b>174 (100.0)</b>		
<b>HADs</b>	<b>Post-surgery HADs</b>		<b>Total</b>	<b>OR (95% CI)</b>	<b>McNemar</b>
<b>Pre-surgery</b>	<b>Yes</b>	<b>No</b>			
Yes	44 (65.7)	23 (34.3)	67 (38.5)	5.9 (3 -11.6)	0.775
No	26 (24.3)	81 (75.7)	107 (61.5)		
<b>Total</b>	<b>70 (40.2)</b>	<b>104 (59.8)</b>	<b>174 (100.0)</b>		
<b>MINI</b>	<b>Post-surgery MINI</b>		<b>Total</b>	<b>OR (95% CI)</b>	<b>McNemar</b>
<b>Pre-surgery</b>	<b>Yes</b>	<b>No</b>			
<b>Depression</b>					
Yes	30 (57.7)	22 (42.3)	52 (29.9)	7.4 (3.5-15.4)	0.755
No	19 (15.6)	103 (84.4)	122 (70.1)		
<b>Total</b>	<b>49 (28.2)</b>	<b>125 (71.8)</b>	<b>174 (100.0)</b>		
<b>Anxiety</b>					
Yes	15 (34.1)	29 (65.9)	44 (25.3)	6.9 (2.8-17.4)	0.002*
No	9 (6.9)	121 (93.1)	130 (74.7)		
<b>Total</b>	<b>24 (13.8)</b>	<b>150 (86.2)</b>	<b>174 (100.0)</b>		

356 \*Significant,  $p < 0.01$ .

357 Out of the 86 respondents with pre-surgery blindness, 57.0% (49/86) had improved vision  
 358 with 44.9% (22/49) having normal vision and 3.5% (3/86) were lost to follow up. Among  
 359 respondents with low or normal vision pre-surgery, 22.0% (20/91) became blind after  
 360 surgery. Overall, 10.5% (19/180) respondents had a reduction from normal vision to low  
 361 vision. There were no post-surgical changes in the vision of 18.9% (34/180) respondents with  
 362 blindness, 12.8% (23/180) with low vision, and 4.4% (8/180) with normal vision. Those with  
 363 blindness at pre-surgery were 2.5 times (95% Confidence Interval (C.I: 1.3 – 4.8) more likely

364 to remain blindness after surgery compared to those without blindness at pre-surgery as  
365 shown in Table 3.

366 Before the surgery, 38.5% (67/174) had psychological distress using HADs. Although, 25.3%  
367 (44/174) and 29.9% (52/174) of the respondents had anxiety and depressive disorders  
368 respectively. But these disorders co-existed in 25.9% (45/174) of the respondents. Post-  
369 operative psychological distress was reported in 40.2% (70/174) of the respondents, while  
370 13.8% (24/174) had anxiety disorder, and depression diagnosed in 28.2% (49/174).  
371 Furthermore, comorbid anxiety and depressive disorders were reported in 14.4% (25/170) of  
372 the respondents with 43.7% reduction compared to pre-operative prevalence. Ophthalmic  
373 surgery alleviates pre-surgical psychological distress in 34.3% (23/67) of respondents, but  
374 24.3% (26/107) respondents without pre-surgical psychological distress, developed it after  
375 surgery. The influence of ophthalmic surgery on psychological distress was insignificant,  
376 McNemar test  $p = 0.78$ . Visually impaired adults with pre-surgical psychological distress are  
377 5.9 times (C.I: 3.0 – 11.6,  $p < 0.001$ ) more likely to have post-surgical psychological distress  
378 compared with those without presurgical psychological distress. Surgical intervention in  
379 visually impaired adults reduced pre-surgical anxiety disorder in 65.9% (29/44) respondents  
380 to 6.9% (9/130) post-surgery, and significant at McNemar test  $p = 0.002$ . However,  
381 ophthalmic surgery did not have significant effect on the pre-surgical depression, McNemar  
382 test  $p = 0.76$ . Overall, 19.5% (34/174) respondents without blindness developed post-surgical  
383 blindness. Among this sub-group of respondents, 32.4% (11/34) had pre-surgical depression.  
384 Ophthalmic surgery had no effect on 54.5% (6/11) of respondents with pre-surgical  
385 depression. However, 8.7% (2/23) respondents without pre-surgical depression developed  
386 post-surgical depression. This effect was insignificant, McNemar test,  $p = 0.45$ .

387 **Effect of surgery on Quality of life of visually impaired adults**

388 The association and effects of ophthalmic surgery on QoL was shown in Table 4.

389 Table 4: Association and effects of ophthalmic surgery on Quality of Life domain among

390 visually impaired adults, NEC Kaduna Nigeria. (n=174)

<b>QoL domain (Pre-surgery)</b>	<b>QoL domain Post - surgery</b>			<b>OR (95% CI)</b>	<b>McNemar</b>
<b>General health</b>					
<b>General health</b>	Poor	Good	Total		
Poor	19 (51.4)	18 (48.6)	37 (21.3)	6.5 (2.9 - 17.7)	1.000
Good	19 (13.9)	118 (86.1)	137 (78.7)		
Total	38 (21.9)	136 (78.1)	174		
<b>Physical health</b>					
<b>Physical health</b>	Poor	Good	Total		
Poor	21 (58.3)	15 (41.7)	36 (20.7)	8.3 (3.6 - 18.6)	0.500
Good	20 (14.5)	118 (85.5)	138 (79.3)		
Total	41 (23.6)	133 (76.4)	174		
<b>Psychological</b>					
<b>Psychological</b>	Poor	Good	Total		
Poor	10 (25.6)	29 (74.4)	39 (22.4)	2.4 (0.9 - 5.8)	0.104
Good	17 (12.6)	118 (87.4)	135 (77.6)		
Total	27 (15.5)	147 (84.5)	174		
<b>Social relationship</b>					
<b>Social relationship</b>	Poor	Good	Total		
Poor	6 (10.2)	53 (89.8)	59 (34.0)	1.5 (0.5 - 4.6)	0.001*
Good	8 (7.0)	107 (93.0)	115 (66.0)		
Total	14 (8.0)	160 (92.0)	174		
<b>Environmental</b>					
<b>Environmental</b>	Poor	Good	Total		
Poor	19 (48.7)	20 (51.3)	39 (22.4)	4.4 (2.0 - 9.5)	0.652
Good	24 (17.8)	111 (82.2)	135 (77.6)		
Total	43 (24.7)	131 (75.3)	174		

391 \*Significant, p<0.01

392 The pre-surgical social relationship QoL domain was most affected, 34.0% (59/180) of the

393 respondents had poor QoL. But post-surgically, 24.7% (23/174) respondents had poor QoL

394 on environmental domain as shown in Table 4. Furthermore, social relationship QoL domain

395 was the most improved post-surgically with a 78.5% reduction in the proportion of

396 respondents with poor QoL and was the only QoL domain with significant McNemar's test, p

397 = 0.001. Eye surgery improved pre-surgical poor QoL on social relationship domain in 89.8%

398 (53/59) respondents compared to 7.0% (8.0/115) that had a declined from good pre-surgical

399 to poor post-surgical QoL on social relationship domain. This effect was significant at  
400 McNemar's test,  $p = 0.001$ . There was a significant association between pre- and post-  
401 surgical poor QoL in general health, physical health, and environmental domains of  
402 WHOQoL-Bref.

### 403 **Discussion**

404 This study described the characteristics and clinical presentations of visually impaired adults.  
405 It revealed that most of the respondents were male and aged > 50 years, and cataract was the  
406 commonest cause of vision impairment. Furthermore, it showed that psychological distress,  
407 anxiety, and depression were commonly-reported mental disorders and a third had poor QoL  
408 on the social relationship domain. Ophthalmic surgery influences the presence of psychiatric  
409 disorders, QoL and blindness. This study shows the positive influence of ophthalmic surgery  
410 on blindness, anxiety disorder, and WHOQoL social relationship domain.

411 Eye disorders and visual impairment are more common in older adults [40] as shown in this  
412 study with three out of four respondents aged 50 years or more. The preponderance of the  
413 male gender in this study was consistent with a study that shows gender discrepancies in  
414 access to health care [41]. Although this study is hospital-based, it differs from another  
415 hospital-based study where both genders were equal [42] and from a population study where  
416 the female gender was predominant [28, 31]. Gender and age may influence the presence of  
417 common psychiatric disorders and QoL.

418 In adults with vision impairments requiring ophthalmic surgery, factors like the burden of  
419 visual impairment, poverty, unemployment, age, and access to health care may worsen QoL  
420 and initiate common psychiatric disorders [11,15,44-46]. Usually, common psychiatric  
421 disorders like depression and anxiety have been reported to co-occur with physical conditions  
422 including vision impairment with prevalence ranging from 3% to 60% [10,47,49,51-54,57].

423 The high prevalence of depression and anxiety disorders in this study was not different from  
424 studies conducted in community and hospital settings [10]. This further supported a call to  
425 identify and manage common psychiatric disorders in non-psychiatric settings. This is  
426 because non-identification of anxiety and depression in visually impaired adults may be  
427 associated with the high cost of treatment, poor quality of care [9, 58], increases in the length  
428 of hospital stay, increases in hospital readmission rates [51], and may worsen the burden of  
429 illness on the individual, the family and the healthcare provider [60, 61, 63, 64].

430 Generally, ophthalmic surgery was believed to improve vision impairment and blindness.  
431 This was supported by this study and significant, McNemar's test,  $p = 0.001$ . Previous studies  
432 have shown the unequivocal views of researchers on the effect of surgery on anxiety and  
433 depression [65, 66]. This study revealed an insignificant reduction (McNemar's test,  $p =$   
434  $0.78$ ) in pre-surgical psychological distress in 34.3% of adults with vision impairment that  
435 had ophthalmic surgery. Generally, the study shows that ophthalmic surgery had no effect on  
436 depression, but significantly reduced the proportion of visually impaired adults with pre-  
437 surgical anxiety, McNemar test  $p = 0.002$ . The study also found that a fifth of the respondents  
438 developed post-surgical blindness and 8.7% developed a post-surgical depression.  
439 Ophthalmic surgery had no significant effect (McNemar test,  $p = 0.45$ ) on depression in this  
440 group.

441 Poor quality of life has been reported among visually impaired [48] and this depends on the  
442 degree of severity of the visual impairment [2,14]. The study shows that ophthalmic surgery  
443 had a significant effect (McNemar's test  $p = 0.001$ ) on WHOQoL-Bref social relationship  
444 domain with 78% reduction among the visually impaired adults with pre-surgery poor QoL in  
445 social relationship domain. This was the only domain of WHOQoL-Bref that was improved  
446 or by ophthalmic surgery. The improvement could be attributed to the change in the vision  
447 impairment following the surgery, perceived improvement in the care and support from the

448 family, perceived satisfaction in a personal relationship, and the improvement in activities of  
449 daily living.

450 The strength of this study was that few attrition rates were reported among the participants  
451 recruited for a longitudinal study like this one. Only 3.3% of the participants were lost to  
452 follow up. For data consistency, the same research assistants conducted the interview at pre-  
453 and post-surgical phase. However, this study was not insulated from limitations, being a  
454 hospital-based study, it should be interpreted with caution and avoid generalizing the  
455 information to general population. We did not remove respondents with comorbid medical  
456 illness from analysis.

457 This study further strengthens the needs for mental health care for visually impaired as  
458 ophthalmic surgery alone is insufficient to provide total health care.

#### 459 **Conclusion**

460 Visually impaired adults have high prevalence of psychological distress, anxiety, and  
461 depression. The domain of WHOQoL-Bref mostly affected was social relationship domain.  
462 Ophthalmic surgery significantly improved blindness, anxiety disorder and social relationship  
463 domain of WHOQoL-Bref, but no effect on depressive disorder. For holistic care of visually  
464 impaired, efforts to promptly identify and manage depression will influence good QoL.

465

#### 466 **Abbreviations**

467 ADL - Activities of daily living (ADL)

468 HADs - Hospital Anxiety and Depression scale

469 ICD - International Statistical Classification of Diseases and related Health problems, 10<sup>th</sup>  
470 revision

471 LTFU - lost to follow up

472 MINI - Mini International Neuro-Psychiatric Interview

473 NEC - National Eye Centre

474 PVA - Presenting Visual Acuity  
475 WHOQoL-Bref - World Health Organization Quality of Life – Bref  
476 World Health Organization Quality of Life Scale – Brief version (WHO QOL – BREF)

477

#### 478 **Ethics approval and consent to participate**

479 Ethical application was approved by Institutional Review Boards at the Federal  
480 Neuropsychiatric Hospital and NEC. Helsinki’s declaration was followed in the process of  
481 obtaining informed consent from the participants. The benefits and risks of involvement in  
482 the study were explained. Participants were informed their voluntary withdrawal at any point  
483 during the study would not affect, in any way, the management of their eye conditions. An  
484 informed written or verbal consent was duly obtained from the participants and were assured  
485 of their confidentiality.

#### 486 **Consent for publication**

487 Not applicable.

488

#### 489 **Availability of data and materials**

490 The datasets used and/or analysed during the current study are available from the  
491 corresponding author on reasonable request.

492

#### 493 **Competing interests**

494 The authors declare that they have no competing interests.

495

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498

#### 499 **Authors’ contributions**

500 OJB conceived the study and was responsible for its design, data collection, analysis and  
501 interpretation; and writing the draft manuscript. MBA contributed to conceptualization of the  
502 study and the design of its protocol, data interpretation, drafting, formatting and final revision  
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504 and revision of the manuscript for intellectual content. All authors read and approved the  
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506

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513

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