

Vision-related quality-of-life in Jamaican glaucoma patients at Kingston Public Hospital

Valence A Jordan¹, Lizette L Mowatt²

¹Kingston Public Hospital, North St, Kingston, Jamaica

²Department of Surgery, University Hospital of the West Indies, Jamaica

Correspondence to: Valence A Jordan. Kingston Public Hospital, North St, Kingston, Jamaica. valencejordan@gmail.com

Received: 2022-02-21 Accepted: 2022-05-11

DOI:10.18240/ijo.2022.11.09

Citation: Jordan VA, Mowatt LL. Vision-related quality-of-life in Jamaican glaucoma patients at Kingston Public Hospital. *Int J Ophthalmol* 2022;15(11):1791-1797

Abstract

• **AIM:** To determine the vision-related quality-of-life of glaucoma patients and the association between clinical and socioeconomic factors, and vision-related quality-of-life.

• **METHODS:** This was a cross-sectional study. Consecutive patients with glaucoma were interviewed using a modified 25-item National Eye Institute Visual Function Questionnaire (VFQ-25) by a single interviewer. Statistical analysis was done to find associations between patient variables and vision-related quality-of-life scores. Confidentiality and anonymity were maintained.

• **RESULTS:** Ninety-six participants were recruited in the study. There were 44 males and the mean age for males and females was 65.7 and 69.5y, respectively. The mean composite score was 71.2 (with a maximum possible score of 100), with the highest mean score in the colour vision subscale (89.8) and the lowest mean score in the driving subscale (34.0). Worse visual acuity ($P<0.001$), longer duration of glaucoma ($P<0.001$) and higher number of glaucoma medications ($P<0.001$) were associated with a worse composite score. Female participants and those who lived in urban areas had significantly better scores than male participants ($P=0.002$) and those who lived in rural areas ($P=0.017$), respectively.

• **CONCLUSION:** The vision-related quality-of-life in Jamaican glaucoma patients is comparable to that of glaucoma patients in the Barbados Eye Study and other international studies using the VFQ-25 questionnaire. Worse quality-of-life scores are associated with poorer visual acuity, longer duration of glaucoma, more glaucoma medications, and sociodemographic factors such as male gender and rural residence.

• **KEYWORDS:** glaucoma; health-related quality-of-life; Jamaica; life quality; vision

INTRODUCTION

Primary open angle glaucoma (POAG) is the most common type of glaucoma and has been reported as being a major cause of blindness in Jamaica since the 1950s^[1]. The Barbados Eye Study found the prevalence of POAG to be 7.0% versus 0.8% in black and white participants, respectively^[2]. Black patients with glaucoma are 4 times more likely to go blind, more likely to be diagnosed at a younger age and likely to have more advanced disease at presentation than their white counterparts^[3].

Quality of life in glaucoma has been measured mostly with the use of self-report questionnaires and to a lesser extent with performance-based studies^[4]. Vision-related quality of life (VRQoL) may be defined as a person's satisfaction with their visual function and its effect on daily life, and this may be negatively impacted by glaucoma-related visual impairment^[5]. Studies have found associations between health-related or VRQoL scores and multiple factors in glaucoma patients including visual acuity^[6-11], visual field status^[6-8,10,12-16], optical coherence tomography^[17], visual symptoms^[18], rate of glaucoma progression^[19], and socio-economic factors such as age, marital status, literacy, and place of residence^[20].

The number of QoL studies in glaucoma has increased since the early 1990's however, there are still fewer QoL studies in glaucoma than in other disabling chronic diseases^[4]. With review of the literature, the Barbados Eye Study is the only study to date that measured the VRQoL in glaucoma patients in a predominantly Afro-Caribbean population and no previous study has been conducted in Jamaica. QoL measures in these patients are of particular importance because of the more aggressive disease course and higher risk of blindness in this population. In this study we examined the VRQoL of Jamaican patients using the 25-item National Eye Institute Visual Function Questionnaire (NEI VFQ-25) which is a VRQoL self-report questionnaire with high validity and reliability^[21].

SUBJECTS AND METHODS

Ethical Approval Received from the University of the West Indies Faculty of Medical Sciences Ethics Committee (ECP 246, 19/20) and the Ministry of Health and Wellness Ethics Committee, Kingston, Jamaica. The study was carried out in accordance with the principles outlined in the Declaration of Helsinki.

Patient Selection and Sampling This was a cross-sectional study conducted at the ophthalmology clinic of the Kingston Public Hospital (KPH). The KPH is a major tertiary institution in the capital city of Kingston, Jamaica which receives island-wide ophthalmology referrals. Patients with a pre-existing diagnosis of glaucoma presenting to the KPH ophthalmology clinic for their routine clinic appointments were identified. Glaucoma diagnosis was based on structural optic disc changes on fundoscopy and characteristic visual field defects on automated threshold perimetry.

Consecutive patients greater than 18 years old with glaucoma and able to give written informed consent were invited to be a part of the study. Patients with concurrent macular pathology, media opacities (cataracts), cognitive, hearing or mobility impairment or a recent history of intraocular surgery (three months) were excluded. A sample size of 75 patients was needed to give the study a power of over 90%.

Data Collection Participants underwent a 15-minute interview conducted by a single, trained interviewer (Jordan VA). Data was collected on age, gender, marital, educational, and employment status, glaucoma duration, best-corrected visual acuity, visual field global indices, antiglaucoma medications and previous eye surgery. The interview was done with a modified version of the NEI VFQ-25 for easier understanding in our Jamaican culture. The scoring system was maintained.

Data Entry and Statistical Analysis All visual acuities were converted to the logMAR equivalent and visual acuities of counting fingers (CF), hand motions (HM), light perception (LP) and no light perception (NLP) were converted to logMAR equivalents of 2.1, 2.4, 2.7, and 3.0 respectively^[22]. Participants were subclassified into those blind in neither eye, blind in one eye and blind in both eyes according to the World Health Organisation (WHO) definition of blindness (best corrected visual acuity worse than 20/500 or visual field of less than 10 degrees).

Participants' answers in the modified VFQ-25 were converted to subscale and composite scores in accordance with the scoring instructions^[23]. Linear regression analyses were performed to quantify the associations between quantitative variables and QoL scores. The independent samples *t*-test and ANOVA were used to test for an association between QoL scores and categorical variables. The Chi-square test was used to look for associations between categorical variables (SPSS Statistics 28).

RESULTS

Participant Characteristics Ninety-six patients were recruited. Their ages ranged from 38 to 95 years old with a mean of 67.4 ± 11.5 y. There were 54.2% females (52/96) and 45.8% males (44/96). All participants were of African descent and had a diagnosis of POAG.

Many participants, 54/96 (56.3%), were retired and the majority, 76/96 (79.2%), of participants reported having a monthly household income of approximately $< \$340$ United States dollars (USD). No participants reported a household income of $> \$1700$. Slightly more than half of the participants had completed at least primary school education (52.1% or 50/96) and 44 (45.8%) possessed up to a secondary school education. Most participants (60/96 or 62.5%) resided in an urban location.

Participants' duration since glaucoma diagnosis ranged from one year to 40y with a mean of 8.52 ± 8.43 y. Visual acuity ranged from 0 to 3.0 logMAR with mean visual acuities of 0.39 in the better eye and 1.03 in the worse eye. Twenty-three patients (24.0%) were blind in one eye and 7 (7.3%) were bilaterally blind.

Patients were on a mean of 2.1 glaucoma drugs (range from 1 to 5) with most (41/96 or 42.7%) only on monotherapy and 24 patients (25.0%) on dual therapy. Amongst the participants, 11 (11.5%) had a history of selective laser trabeculoplasty (SLT) and 3 (3.13%) had a history of augmented trabeculectomy in at least one eye.

Only 27.1% of patients (26/96) had a Humphrey visual field test done within the prior two years and only 17.7% (17/96) had one documented within the previous year. For those patients who had a documented visual field within 1y the mean visual field index was $48\% \pm 5.66\%$ (range 2% to 100%) and the average mean deviation was -15.18 ± 10.52 (range -1.36 to -32.38) dB. A summary of the sociodemographic and medical characteristics of study participants is shown in Table 1.

Composite and Subscale Scores Participants had a mean composite score of 71.2 (95%CI 66.8-75.7), with a range from 16.3 to 98.8. Participants, on average, scored highest in the colour vision subscale (89.8) and lowest in the driving subscale (34.0). The general health subscale, which has no contribution to the composite score, had a mean of 47.4 and there was no statistical correlation between general health subscale scores and composite scores (Pearson correlation coefficient 0.066). Participant scores on all vision-targeted subscales are summarised in Table 2.

Visual and Sociodemographic Correlates There was a significant association between lower composite scores and worse visual acuity in participants' better ($P < 0.001$, $R^2 = 0.400$) and worse ($P < 0.001$, $R^2 = 0.400$) eyes. For each 0.1 worsening in the logMAR visual acuity of the better or worse eye, the composite score decreased by 2.19 and 1.23 respectively ($\beta = -21.9$,

Table 1 Sociodemographic and medical characteristics of study participants

Parameters	Cross-sectional study (n=96)
Age, y (mean±SD)	67.4±11.5
Gender, n (%)	
Female	52 (54.2)
Male	44 (45.8)
Employment status, n (%)	
Unemployed	15 (15.6)
Employed	27 (28.1)
Retired	54 (56.3)
Monthly income, n (%)	
<\$340 USD	76 (79.2)
\$340-\$680 USD	18 (18.8)
\$680-\$1700 USD	2 (2.1)
Education level, n (%)	
Primary	50 (52.1)
Secondary	44 (45.8)
Tertiary	1 (1.1)
Residence, n (%)	
Rural	36 (37.5)
Urban	60 (62.5)
Glaucoma duration in years (mean±SD)	8.52±8.43
Comorbidities, n (%)	
Diabetes	28 (29.2)
Hypertension	64 (66.7)
Ophthalmic treatments, n (%)	
Prostaglandin analogue	85 (88.5)
Timolol	50 (52.1)
Dorzolamide/brinzolamide	34 (35.4)
Brimonidine	23 (24.0)
Pilocarpine	1 (1.0)
Oral acetazolamide	4 (4.2)
Selective laser trabeculoplasty	11 (11.5)
Cataract surgery	19 (19.8)
Trabeculectomy	3 (3.13)

Table 2 Composite and subscale scores for participants in the 25-item National Eye Institute Visual Function Questionnaire

Parameters	Mean	95%CI	Median
Composite score	71.2	66.8-75.7	76.6
General vision	59.2	54.0-64.0	60.0
Ocular pain	75.4	70.9-79.9	81.3
Near activities	69.4	64.2-74.5	75.0
Distance activities	67.1	61.3-73.0	75.0
Social functioning	83.2	77.5-88.9	100.0
Mental health	63.5	57.4-69.6	68.8
Role difficulties	70.7	65.0-76.4	75.0
Dependency	73	66.3-79.7	87.5
Driving	34	10.1-58.0	20.8
Colour vision	89.8	85.2-94.5	100.0
Peripheral vision	64.3	58.5-70.1	75.0

Table 3 Association between visual acuity and composite and subscale scores for participants

Parameters	VA in the better eye Beta coefficient (P)	VA in the worse eye Beta coefficient (P)
Composite score	-0.40 (<0.001)	-0.40 (<0.001)
General vision	-0.27 (0.012)	-0.33 (0.003)
Ocular pain	0.10 (0.430)	-0.25 (0.050)
Near activities	-0.36 (<0.001)	-0.34 (<0.001)
Distance activities	-0.41 (<0.001)	-0.29 (0.005)
Social functioning	-0.48 (<0.001)	-0.21 (0.035)
Mental health	-0.19 (0.076)	-0.40 (<0.001)
Role difficulties	-0.27 (0.008)	-0.43 (<0.001)
Dependency	-0.49 (<0.001)	-0.23 (0.019)
Driving	-0.60 (0.132)	-0.09 (0.815)
Colour vision	-0.49 (<0.001)	-0.20 (0.055)
Peripheral vision	-0.19 (0.052)	-0.52 (<0.001)

Table 4 Association between glaucoma-related factors and composite and subscale scores for participants

Parameters	Glaucoma duration in years Beta coefficient (P)	Number of glaucoma medications Beta coefficient (P)
Composite score	-0.33 (<0.001)	-0.25 (0.014)
General vision	-0.24 (0.019)	-0.11 (0.280)
Ocular pain	-0.07 (0.486)	-0.003 (0.979)
Near activities	-0.25 (0.011)	-0.24 (0.017)
Distance activities	-0.33 (0.001)	-2.0 (0.045)
Social functioning	-0.35 (<0.001)	-0.14 (0.142)
Mental health	-0.16 (0.125)	-0.18 (0.075)
Role difficulties	-0.21 (0.034)	-0.26 (0.009)
Dependency	-0.28 (0.005)	-0.093 (0.352)
Driving	0.12 (0.711)	-0.16 (0.644)
Colour vision	-0.25 (0.014)	-0.23 (0.019)
Peripheral vision	-0.28 (0.004)	-0.23 (0.017)

$\beta=-12.3$). Furthermore, patients who were blind in one eye or both eyes had significantly worse composite scores (58.9±19.7 and 30.7±13.9 respectively) and subscale scores than those who were blind in neither eye (79.7±15.8, $P<0.001$) with the exception for the general health subscale (Figure 1).

Significant associations were also found between lower composite scores and a longer duration of glaucoma ($P<0.001$, $R^2=0.111$) and a higher number of glaucoma medications being taken ($P=0.014$, $R^2=0.063$). Each additional year after being diagnosed with glaucoma was associated with a 0.87 decrease in composite score. There was no significant association between composite scores and age ($P=0.21$), mean deviation in the better or worse eye ($P=0.12$, 0.73), or visual field index in the better or worse eye ($P=0.18$, 0.34). Multiple subscales had statistically significant associations with the investigated variables (Tables 3 and 4).

Female participants had significantly higher composite scores (77.4±16.8) than their male counterparts (63.9±25.1, $P=0.002$)

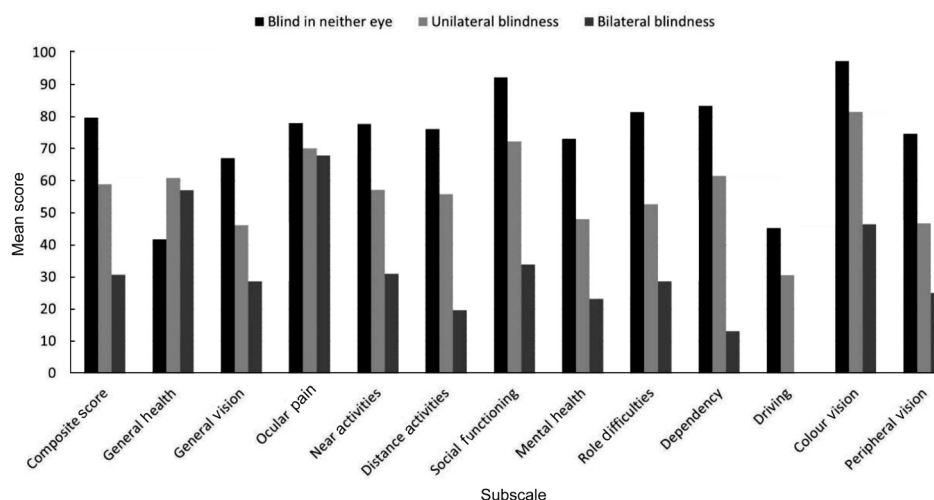


Figure 1 Comparison of VFQ-25 composite and subscale scores between subgroups.

with a lower extent of spread (Figure 2) and significantly better scores on all vision-targeted subscales except ocular pain and driving. Male participants also had significantly worse visual acuity than the female participants in both the better (Mean 0.63 vs 0.17 logMAR, $P < 0.001$) and worse eye (Mean 1.60 vs 0.54 logMAR, $P < 0.001$). There was no significant association between gender and employment status ($P = 0.092$) or gender and education level ($P = 0.368$).

Participants living in urban areas (75.3 ± 19.4) had significantly higher composite scores than those living in rural areas (64.3 ± 24.4 , $P = 0.017$; Figure 3) and had significantly higher scores in the general vision ($P < 0.001$), mental health ($P = 0.027$), role difficulties ($P = 0.011$) and dependency ($P = 0.010$) subscales. Participants living in rural areas also had significantly worse visual acuities in both their better eye (mean 0.57 vs 0.28 logMAR, $P = 0.031$) and worse eye (mean 1.33 vs 0.85 logMAR, $P = 0.040$) than their urban counterparts. There was no significant association between location of residence and employment status ($P = 0.127$), income level ($P = 0.482$) or education level ($P = 0.870$).

No association was found between composite scores and marital status ($P = 0.934$), employment status ($P = 0.291$) or educational level ($P = 0.742$). A history of laser trabeculectomy, cataract surgery or trabeculectomy also had no association with composite scores on the modified VFQ-25.

DISCUSSION

The VRQoL score for Jamaican glaucoma patients in our study was similar to Barbadian patients (71.2 vs 78.9 respectively)^[2]. Similar VFQ-25 composite scores were found in glaucoma patients in the Los Angeles Latino Eye Study (LALES; mean 73.2 with visual field loss)^[14] and the Tube versus Trabeculectomy (TVT) Study (71.9 ± 17.9 at baseline and 73.5 ± 20.0 at 5y)^[24]. Participants in the Early Manifest Glaucoma Trial were newly diagnosed with open angle glaucoma and scored a higher mean composite score of 88

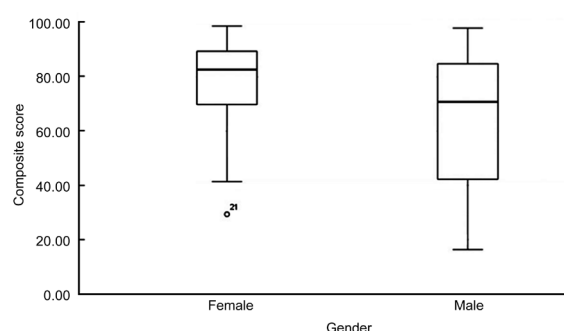


Figure 2 Box and whisker plot of composite NEI VFQ-25 scores by gender.

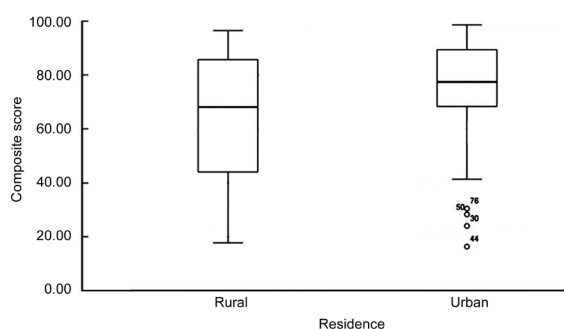


Figure 3 Box and whisker plot of composite NEI VFQ-25 scores by place of residence.

at 3y^[25] suggesting that patients with early glaucoma retain a high vision-related quality-of-life and highlighting the need for early diagnosis and intervention.

The strongest associations with lower composite scores in our study were with worse visual acuity in the better or worse eye and longer duration of glaucoma. Several previous studies have noted associations between VFQ-25 composite scores and visual acuity including the EMGT^[25], TVT Study^[24], and studies by Labiris *et al*^[26] and Onakoya *et al*^[27]. The negative correlations between the VRQoL and both glaucoma duration and number of glaucoma medications are in keeping with the progressive nature of glaucoma.

In published literature, associations between VRQoL and visual field parameters, particularly the mean deviation (MD)^[6-7,9-10,12,24-26] and pattern-standard deviation (PSD)^[26], have been noted, however this was not found in our data. The small proportion of study participants with recent documented visual field tests in our study makes associations with visual field parameters difficult to make, however patients were included in the study independent of whether they had recent visual field tests to avoid sampling bias. We also found no association between age and composite score in our study although this has also been found in other studies^[25].

Male participants in our study not only had worse QoL scores but also worse visual acuity which could explain the difference in VFQ-25 composite scores. The reasons for male participants in our study having worse outcomes than their female counterparts are unclear, but this could be caused by gender differences in health-seeking behaviour, adherence, social support, or lifestyle. Jamaican men present late for health complaints^[28-29], and poor attentiveness to symptoms, and poor education and knowledge of their illnesses may be contributing factors although no association between gender and education status was found in our data. Interestingly, men scored higher composite VFQ-25 scores (84.7±13.3) than women 78.7±15.5 ($P=0.042$) in a similar Greek study^[26].

Place of residence also had a significant association with QoL in our study, with patients from rural areas having worse mean composite scores than those from urban areas. Rural patients also had significantly worse visual acuity scores. These findings are in keeping with prior studies which have demonstrated health inequity in Jamaica with rural and poor residents having worse health outcomes and insurance coverage^[30-32]. Possible explanations include worse education and access to information, worse access to healthcare facilities and pharmacies and an inability to afford healthcare and medications. There was no significant association between location of residence, education, and income in our study. The National Survey of Blindness and Visual Impairment in Nigeria also found a negative association between self-reported visual function and living in rural areas^[20].

There was no association between monthly income and QoL in our study, however, most of our patients had a monthly household income below 340 USD and higher income levels were not well represented. The economic burden of glaucoma is well documented with direct costs *e.g.*, medications, hospital visits, surgical and procedural costs, and transportation, and indirect costs from loss of productivity of the patients and caregivers, contributing to the problem^[5].

Participants who were blind in either or both eyes in our study had a higher mean general health subscale score than those blind in neither eye. The reason for this isn't evident however

this could be due to confounding factors such as personality, better healthcare or social support provided to blind patients or appreciation by blind persons for other aspects of their health. Patients in our study had slightly worse mean composite VFQ-25 scores than those previously reported in Barbadian glaucoma patients^[2]. This could possibly be attributed to sociodemographic differences between Jamaica and Barbados despite both being islands in the Caribbean with a similar ethnicity mix. A comparison of the two countries shows that Barbados has a higher human development index (0.814 vs 0.734), with a higher gross national income per capita (14936 vs 9319 PPP in USD), literacy rate (99.6% vs 88.1%) and life expectancy at birth (79.2 vs 74.5y)^[33].

Based on our results, more attention should be given to male and rural Jamaican patients with glaucoma to ensure adequate access to healthcare and medications, adherence to treatment regimes, knowledge of their disease and social support. Closer monitoring of glaucoma patients with Humphrey visual fields is recommended however this is limited by a lack of resources in public hospitals and low patient income. Interventions such as augmented trabeculectomies and laser trabeculoplasties could be considered earlier to preserve visual function in glaucoma patients with documented progression. The low rate of glaucoma surgery in this population may be due to patient factors, such as cultural reluctance to surgery and lack of understanding, and a lack of training and surgical volume in filtering surgery by local surgeons.

Some limitations of this study include the use of a self-report questionnaire which may be subject to bias, and poor recall. Patient responses in questionnaires may be affected by knowledge of their diagnosis, expectations, and psychological adaptation^[4]. Some clinical data was prone to incompleteness due to its retrospective nature. Staging of glaucoma in this study was impossible due to the limited visual field data. The cross-sectional design of this study is unable to follow changes in QoL over time. The external validity of this research may be affected by the relative uniformity of our study population with most patients being from a lower socioeconomic background.

This is the first study to examine the VRQoL of Jamaican glaucoma patients and demonstrates that the VRQoL in this group of patients is like previously published studies. This study also adds further data regarding the VRQoL in Afro-Caribbean patients, a group specifically known to have worse glaucoma outcomes than other ethnic groups. Our study also identified two groups at risk of having poorer outcomes amongst our population: patients of male gender and those living in rural areas. This study serves as a baseline and source of comparison for further glaucoma QoL research in Jamaica and the Caribbean.

ACKNOWLEDGEMENTS

Conflicts of Interest: Jordan VA, None; Mowatt LL, None.

REFERENCES

- 1 Degazon D. Primary glaucoma: pathogenesis and Jamaican aspects. *W Indian Med J* 1952;1(2):178-194.
- 2 Wu SY, Hennis A, Nemesure B, Leske M. Impact of glaucoma, lens opacities, and cataract surgery on visual functioning and related quality of life: the Barbados eye studies. *Invest Ophthalmol Vis Sci* 2008;49(4):1333-1338.
- 3 American Academy of Ophthalmology. 2020-2021 Basic and Clinical Science Course (BCSC) Section 10 Glaucoma. AAO; 2020.
- 4 Glen FC, Crabb DP, Garway-Heath DF. The direction of research into visual disability and quality of life in glaucoma. *BMC Ophthalmol* 2011;11:19.
- 5 Cesareo M, Ciuffoletti E, Ricci F, Missiroli F, Giuliano MA, Mancino R, Nucci C. Visual disability and quality of life in glaucoma patients. *Prog Brain Res* 2015;221:359-374.
- 6 Wu N, Kong XM, Gao J, Sun XH. Vision-related quality of life in glaucoma patients and its correlations with psychological disturbances and visual function indices. *J Glaucoma* 2019;28(3):207-215.
- 7 Sung KR, Chun YS, Park CK, Kim HK, Yoo C, Kim YY, Park KH, Kim CY, Choi KR, Lee KW, Han S, Kim CS; LIGHT (Life quality of the glaucoma patient who underwent treatment) study of Korean Glaucoma Society. Vision-related quality of life in Korean glaucoma patients. *J Glaucoma* 2017;26(2):159-165.
- 8 Yamazaki Y, Sugisaki K, Araie M, Murata H, Kanamori A, Inoue T, Ishikawa S, Yoshikawa K, Maeda H, Yamada Y, Negi A, Inatani M, Tanihara H, Okinami S, Mizuki K, Mishima K, Uchida K, Matsumoto S. Relationship between vision-related quality of life and central 10° of the binocular integrated visual field in advanced glaucoma. *Sci Rep* 2019;9(1):14990.
- 9 Chun YS, Sung KR, Park CK, Kim HK, Yoo C, Kim YY, Park KH, Kim CY, Choi KR, Lee KW, Han S, Kim CS; LIGHT (Life Quality of Glaucoma Patients Who Underwent Treatment) study of the Korean Glaucoma Society. Factors influencing vision-related quality of life according to glaucoma severity. *Acta Ophthalmol* 2019; 97(2):e216-e224.
- 10 Machado LF, Kawamuro M, Portela RC, Fares NT, Bergamo V, de Souza LM, Paranhos A Jr, Prata TS, Gracitelli CPB. Factors associated with vision-related quality of life in Brazilian patients with glaucoma. *Arq Bras Oftalmol* 2019;82(6):463-470.
- 11 Majerníková E, Hudáková A, Obročníková A, Grešš Halász B, Kaščáková M. Quality of life of patients with glaucoma in Slovakia. *Int J Environ Res Public Health* 2021;18(2):485.
- 12 Pujol Carreras O, Anton A, Mora C, Pastor L, Gudiña S, Maull R, Vega Z, Castilla M. Quality of life in glaucoma patients and normal subjects related to the severity of damage in each eye. *Arch De La Sociedad Española De Oftalmol* 2017;92(11):521-527.
- 13 Dhawan M, Hans T, Sandhu PS, Midha N. Evaluation of vision-related quality of life in patients with glaucoma: a hospital-based study. *J Curr Glaucoma Pract* 2019;13(1):9-15.
- 14 Mckean-Cowdin R, Wang Y, Wu J, Azen SP, Varma R, Los Angeles Latino Eye Study Group. Impact of visual field loss on health-related quality of life in glaucoma. *Ophthalmology* 2008;115(6):941-948.e1.
- 15 Rulli E, Quaranta L, Riva I, Poli D, Hollander L, Galli F, Katsanos A, Oddone F, Torri V, Weinreb RN, Italian Study Group on QoL in Glaucoma. Visual field loss and vision-related quality of life in the Italian Primary Open Angle Glaucoma Study. *Sci Rep* 2018;8(1):619.
- 16 Wang Y, Alnawsi S, Ke M. The impact of mild, moderate, and severe visual field loss in glaucoma on patients' quality of life measured via the Glaucoma Quality of Life-15 Questionnaire: a meta-analysis. *Medicine (Baltimore)* 2017;96(48):e8019.
- 17 Prager AJ, Hood DC, Liebmann JM, De Moraes CG, Al-Aswad LA, Yu Q, Cioffi GA, Blumberg DM. Association of glaucoma-related, optical coherence tomography-measured macular damage with vision-related quality of life. *JAMA Ophthalmol* 2017;135(7):783-788.
- 18 Kim YS, Yi MY, Hong YJ, Park KH. The impact of visual symptoms on the quality of life of patients with early to moderate glaucoma. *Int Ophthalmol* 2018;38(4):1531-1539.
- 19 Waisbourd M, Sanvicente CT, Coleman HM, Sieburth R, Zhan TT, Gogte P, Muhire R, Wizov SS, Moster MR, Pro MJ, Fudenberg SJ, Mantravadi AV, Myers JS, Katz LJ, Hark LA, Spaeth GL. Vision-related performance and quality of life of patients with rapid glaucoma progression. *J Glaucoma* 2019;28(3):216-222.
- 20 Tran HM, Mahdi AM, Sivasubramaniam S, Gudlavalleti MVS, Gilbert CE, Shah SP, Ezelum CC, Abubakar T, Bankole OO, Nigeria National Blindness and Visual Impairment Study Group. Quality of life and visual function in Nigeria: findings from the National Survey of Blindness and Visual Impairment. *Br J Ophthalmol* 2011; 95(12):1646-1651.
- 21 Mangione CM. Development of the 25-list-item National Eye Institute Visual Function Questionnaire. *Arch Ophthalmol* 2001;119(7):1050.
- 22 Jackson TL, Donachie PHJ, Sparrow JM, Johnston RL. United Kingdom national ophthalmology database study of vitreoretinal surgery: report 1; case mix, complications, and cataract. *Eye (Lond)* 2013;27(5):644-651.
- 23 Visual Function Questionnaire (VFQ-25). Rand.org. 2021 Available on 31 May 2021. https://www.rand.org/health-care/surveys_tools/vfq.html
- 24 Kotecha A, Feuer WJ, Barton K, Gedde SJ, Tube Versus Trabeculectomy Study Group. Quality of life in the tube versus trabeculectomy study. *Am J Ophthalmol* 2017;176:228-235.
- 25 Peters D, Heijl A, Brenner L, Bengtsson B. Visual impairment and vision-related quality of life in the Early Manifest Glaucoma Trial after 20 years of follow-up. *Acta Ophthalmol* 2015;93(8):745-752.
- 26 Labiris G, Katsanos A, Fanariotis M, Zacharaki F, Chatzoulis D, Kozobolis VP. Vision-specific quality of life in Greek glaucoma patients. *J Glaucoma* 2010;19(1):39-43.
- 27 Onakoya AO, Mbadugha CA, Aribaba OT, Ibidapo OO. Quality of life of primary open angle glaucoma patients in Lagos, Nigeria: clinical and sociodemographic correlates. *J Glaucoma* 2012;21(5):287-295.

- 28 Bourne PA, Morris C, Charles CA, Eldemire-Shearer D, Kerr-Campbell MD, Crawford TV. Health literacy and health seeking behavior among older men in a middle-income nation. *Patient Relat Outcome Meas* 2010;1:39-49.
- 29 Morris C, James K, Laws H, Eldemire-Shearer D. Health status and health-seeking behaviour of Jamaican men fifty-five years and over. *West Indian Med J* 2011;60(3):322-329.
- 30 Bourne PA, McGrowder DA. Rural health in Jamaica: examining and refining the predictive factors of good health status of rural residents. *Rural Remote Health* 2009;9(2):1116.
- 31 Bourne PA, Eldemire-Shearer D, McGrowder D, Crawford T. Examining health status of women in rural, peri-urban and urban areas in Jamaica. *N Am J Med Sci* 2009;1(5):256-271.
- 32 Scott E, Theodore K. Measuring and explaining health and health care inequalities in Jamaica, 2004 and 2007. *Rev Panam Salud Publica* 2013;33(2):116-121,3 p preceding 116.
- 33 United Nations Development Programme. Human Development Report 2020. United Nations; 2021.